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THE LONDON NATURALIST



The Journal of the
LONDON NATURAL HISTORY SOCIETY

FOR THE YEAR
1926

Price Three Shillings

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1927



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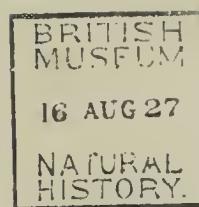
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YOUNG GREATER BLACK-BACKED GULL
Isles of Scilly
Annet Island. June 16th, 1926.
Photograph by Miss C. Longfield

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INSECT VISION

By I. HENRY BURKILL, M.A., F.L.S.

Abstract of a Paper read to the Society on April 20th, 1926

THE reader began by rapidly tracing the manner in which it became known to the western world that plants possess sex, and that pollination leads to seed-production. The Assyrians had been in the habit of carrying the male flowers of the date to the female palm, and the Greeks and Romans knew that this was so; but the story to Parkinson in London in 1640 appeared foolishness. However, not a generation later Bobart shewed how *Lychnis dioica* might be fertilised: and Millington hazarded that the stamens are male organs. Grew quoted Millington in 1682: and Camerarius proved him right as regards *Mercurialis annua* in 1688. Ray in 1690 recalled the story of the date-palm without rebutting it. Burckhardt in 1702, Moreland in 1703, Geoffroi in 1711, Vaillant in 1717, A. de Jussieu in 1721 and Bradley in 1724 admitted sex. Gleditsch in 1749 procured pollen from a male Chamaerops palm in Leipzig and caused a female palm in Berlin to fruit for the first time. Sex in plants thus passed beyond dispute, and made so deep an impression that Linnaeus founded his sexual system of classification in 1753, without great opposition. The large part which insects play in securing the fertility of flowers could no longer escape attention. Phillip Miller had asserted it in 1761. Then Christian Conrad Sprengel in 1787, assigned to insects the pollination of flowers as a mission for which they had been created: he saw in the brightness of the corollas signals to attract them, and in the honey their reward, and in the shape of the corollas wonderful devices to ensure success.

Sprengel lived too early. His ideas were beyond the thought of his contemporaries, who could not envisage a service so universal as that which he claimed for insects, nor admit the possession of anything so like intention in plants as the display of purposeful attractiveness. He had one contemporary who might have understood him, Andrew Thomas Knight; but circumstances held them apart. Of the then leaders of Botany, Schleiden was almost abusive towards Sprengel: and A. P. de Candolle in 1832 with greater tolerance stated his conviction that fertilisation by insects might be an incident, but was not a function. Of Knight it may be said that the paper in which he asserted the all-importance of sexual intercourse in plants was in 1841 not considered worthy of being reprinted with his other contributions to science. Darwin in 1862 unearthed it, and focussed a fresh interest upon the cross-pollination of flowers by his postulate that Nature abhors perpetual self-fertilisation. Critics after this began to ask if insects see as we see.

The human eye sorts the light rays: vibrations round about $700\mu\mu$ in length we appreciate and call red: vibrations round about $620\mu\mu$ orange, $580\mu\mu$ yellow, $530\mu\mu$ green, $470\mu\mu$ blue, $420\mu\mu$ violet: and there are vibrations of less length of which we are aware but not by sight and call ultra-violet. The human skin is penetrated by all these, and is especially acted on by the larger; but it cannot pass to the brain any information as to their nature. A chameleon's skin is more sensitive to them, reacting by changes in its cells: and as Graber shewed, the common Cockroach re-acts through its nervous system to blue and red even when blinded, appreciating a difference between them felt through the skin. Ants, as Lubbock shewed, appreciate ultra-violet, and Forel found that this is through the eyes. On the other hand the human eye may be colour-blind in different degrees, passing to the brain a perception of brightness without a perception of colour, or it may have only an imperfect perception: and the normal eye is unable when it receives at the same spot mixed rays to sort them aright, taking a mixture of yellow and blue for green, and red and blue for grey. Warned by our own imperfections, caution as to what the extremely unlike eye of an insect sees, should be natural to us.

Insects' eyes are of two kinds, ocelli and compound eyes with mosaic vision. Ocelli seem rather to be of the nature of lenses which signal inwards. The mosaic vision of the compound eye is that by which objects are recognised. But how much more ineffectually than human vision is guessed when we compare the number of nerve-endings, and recollect that the eye of an insect faces an enormously greater part of its surroundings. The vision indeed must be hazy except at minute distances; and it can be calculated that a hive-bee is probably unable to realise that a pansy flower is bilaterally symmetrical at a greater distance than four inches, or to see the hive's outline at a greater distance than a few yards. Instead, as it homes, the destination appears a patchwork, the patches gradually and in a way kaleidoscopically growing less indefinite. To a feeding bee a flower as the source of food, is an area to be touched by the feet, and known commonly by experience as an object with a definite relationship in diameter to the span of its legs. A bee, changing its flower, like a man upon an irregular stairway, is thrown into hesitation in the finding of the foothold, and avoids change with a fixed instinct. From this comes its habit of reiteration, seeking clover-flower after clover-flower if that is the flower of the day, or whatever other flower it may be: and the connection of foothold with its work suggests that possibly its vision is at best at a distance not much greater than the distance from eye to feet. But this is a speculation. Yet it may be calculated that an object $\frac{1}{10}$ inch across is to it a point at $3\frac{1}{2}$ inches, one $\frac{1}{2}$ inch across a point at 16 inches, and one 1 inch across a point at 3 feet.

The maiden flight of a hive-bee is an orienting flight. The insect emerges from the hive and flies around near it. Later it grows bolder and goes farther afield, joining the gatherers who take boldly the bee-way in the air outwards when seeking food, and entering the bee-way again after feeding or in flight at a storm. It may be assumed that it

homes partly by a gathering knowledge of its neighbourhood, and partly by the herding instinct in it which suggests movement as other bees are moving. Early death is very likely; and probably often by losing the way. Lundie found that though his bees spent more time in the hive than outside it, 98 per cent of those lost died outside, and their average of journeys was but sixteen.

Continental bee-keepers paint the fronts of their hives in distinguishing colours under the idea that they so aid the insects to return. Their procedure is empirical.

Now it is not impossible that there is an undetected difference between the insect's receptivity of colour-stimuli when actively seeking food and when, after feeding, seeking rest, or one may say relative darkness: and this possibility should not be forgotten.

Lubbock in 1875 demonstrated that the hive-bee and a wasp have colour-vision, for he could train them to feed on papers of certain colours: and Forel in 1878 demonstrated the same for a bumble-bee and a wasp. But the latter complicated his experiments by varying the size of the paper, and he used over-large pieces, getting a result really undeserved,—that colour had a greater appeal to his bumble-bee than shape. In 1882 Hermann Mueller arguing that paper is no natural object, took the coloured parts of flowers and placing them between glass slips, by a number of patient comparisons shewed that the hive-bee distinguishes all the primary colours and a certain number of the shades within them. But,—most important,—he shewed that one insect would exhibit one preference, another another, and insects would change their preferences, that is to say, their mental association of a certain colour with feeding.

The Peckhams' experiment with homing wasps was very instructive. Placing coloured papers about the entrance to the nest, so that approach was through a hole in them, they obtained clear evidence of colour-vision. Bethe in 1896 experimented with homing hive-bees. He covered the hive with branches and disguised the immediate neighbourhood; he even cut down a plane tree close by, and he claimed that these changes did not hinder the approach of the homing bees: but if his account be read carefully, it appears that they did hinder them considerably. He experimented also by rotating the hive, and when it had passed through 45° the insects were lost. He did not take the view that the direction might be determined at a distance whereat these changes were immaterial, nor that one bee's movements direct those of another.

Quite recently von Frisch has described better experiments. He constructed a five-chambered hive, and trained his bees to seek food in the chamber masked with blue by the side of which was one masked with yellow. By moving the paper masks he could send the trained bees astray.

A still better experiment has been described by Kuhn and Pohl, who trained hive bees to feed on a white table at honey illuminated by one of the lines of the spectrum of mercury, the others being cut out. When the other lines were no longer cut out, the bees still went to the

line upon which they had been trained. Shut out from this, they sought the nearest visible.

Some twenty years ago Plateau assailed the idea that colours attract insects to flowers, and gathered a most miscellaneous array of observations, not adequately statistical, to prove his view. Von Hess followed him with an assertion made in 1913 and repeated in 1918 that insects are totally colour-blind. Neither of these two made good his position. To the latter von Frisch replied with an ingenious experiment made by the use of a chess-board in various shades of grey, with one or two coloured squares in it, arguing that if colour-blind the insects would see the blue or whatever it was, as a shade of grey, and confuse it: but this they did not do. Knoll subsequently used the same board to ascertain if the fly *Bombylius fuliginosus* when feeding from *Muscari* flowers would pick out a similar blue, and it did. But von Frisch found when testing bees that they confused scarlet with a dark grey, as if such true reds were beyond their colour vision.

Knoll's work with the moth *Macroglossa stellatarum* has yet more interest than anything which had been published earlier. In autumn when the moths were seeking to hibernate, he was able to prove that they appreciate size, settling by preference upon black circles sufficiently wide to be regarded as holes to admit their bodies: and they chose circles in preference to other geometric figures of similar dimensions. In this state of seeking darkness scarlet was to them as black; blue was brighter, and yellow brighter (less desired) still.

Von Frisch had tried to train bees onto geometric figures, and had failed: but his pieces of paper were far too large, so that the insects at close range would lose the margins in haziness. But he had success in training bees onto colour in concentric rings; and Knoll in a similar way found that circles were the more attractive when given a sharply contrasting border. Von Frisch trained bees to visit a circle with the right half blue and the left yellow; but when the area was divided into quadrants the results were indifferent, and when it was divided into octants they failed. He also used figures like gigantic flowers, which may be regarded as unduly large.

Surely shape is seen by insects at near distances, and probably best seen when it is neither much larger nor very much smaller than the insect itself. Insects have need of such vision to find ways through leafage, those that nest for their nests, and all for their mates. Hermann Mueller stated that the more conspicuous the flower, the better visited; but he did not examine into the relationship of the size of the flower and the size of the insect. He also called attention to the way in which certain lepidoptera congregate upon flowers of their own colour. Is not this connected with the colour vision by which they see their mates?

LONDON BIRDS

By A. HOLTE MACPHERSON

SUMMARY OF NOTES IN 1926

ON JANUARY 5th, sixty-five Tufted Duck were on the Serpentine.

JANUARY 6th, saw a Black-headed Gull perched on a young Weeping Willow tree on the Island in the Serpentine. In the autumn this tree became a regular resort of this species.

JANUARY 9th, a Herring Gull, a Common Gull, ten Coots and fourteen Pochard on the Serpentine; and five of the last species on the Round Pond.

JANUARY 13th, saw a Fieldfare and two Redwings in Hyde Park.

JANUARY 14th, three Fieldfares flew over Kensington Gardens. Saw about a dozen Redwings near Hyde Park Corner. Thermometer 26° F. at 8 a.m.

JANUARY 18th, saw two Goldfinches in the Kensington Gardens Sanctuary. Three or four Skylarks were walking about on the frozen Serpentine.

JANUARY 21st, counted ten Pochard and no less than eighty-nine Tufted Duck on the Serpentine.

JANUARY 26th, saw a Great Crested Grebe, flying from the E., alight on the Serpentine at its widest point.

JANUARY 28th, Tufted Duck on the Serpentine have become fewer, but there are eighteen Pochard and a few Herring Gulls.

February 3rd, the Pochard have increased to twenty, of which fifteen are old males.

FEBRUARY 8th, heard a Chaffinch in song near Hyde Park Corner.

FEBRUARY 12th, a Blackbird singing by Lady Holland's Walk.

March 22nd, Several Redwings in Kensington Gardens.

MARCH 29th, saw a flock of from forty to fifty Meadow Pipits on the open ground near the Long Water.

April 7th, a Linnet flew over the Hyde Park Sanctuary.

APRIL 8th, heard a Willow Wren singing in Hyde Park.

APRIL 13th, Willow Wrens in song in Kensington Gardens and in the grounds of Holland House. Saw newly hatched ducklings on the Serpentine.

APRIL 14th, saw a Swallow flying over the Round Pond.

APRIL 18th, heard a Cuckoo calling from the grounds of Holland House very soon after daybreak.

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APRIL 21st, two pairs of Tufted Duck still frequent the Serpentine.

APRIL 22nd, heard a Sedge Warbler singing strongly in the Kensington Gardens Sanctuary.

APRIL 28th, a Reed Warbler singing in the Kensington Gardens Sanctuary and half a dozen Swallows flying over the Island in the Serpentine.

MAY 9th, heard a Sedge Warbler and a Garden Warbler both singing near the Long Water. Eight Tufted Duck have mysteriously appeared on the Round Pond. Heard the Cuckoo, Stock Dove, and Blackcap in the grounds of Holland House.

MAY 10th, my wife heard a Cuckoo calling from the direction of Holland House. We heard it again on various occasions during the next few days.

MAY 12th, a Swift over the Long Water.

MAY 13th, heard a Wood Wren singing in Kensington Gardens.

MAY 31st, watched two Whitethroats in the Kensington Gardens Sanctuary.

JUNE 1st, a pair of Spotted Flycatchers are in their old haunts near the band stand in Hyde Park. A Canada Gander and an Egyptian Goose, which have paired, swimming about with four young.

JUNE 10th, counted seven Tufted Duck, four of them drakes, on the Serpentine. Another pair of Spotted Flycatchers are near the Kensington Gardens Tea House.

JUNE 12th, Swifts have not frequented the Serpentine regularly this summer, but to-day about a dozen were flying over it.

JUNE 14th, saw and heard a Stock Dove near the Long Water.

JUNE 16th, heard a Cuckoo in Kensington Gardens repeat its call ninety-one times without a break.

JUNE 17th, saw a Great Crested Grebe on the Long Water.

JUNE 25th, heard Blackcap and Stock Dove in the grounds of Holland House.

JUNE 26th, two Swifts flew and screamed over Campden Hill Square.

JULY 5th, saw a Tufted Duck with a newly hatched brood in St. James's Park.

JULY 8th, a Tufted Duck with one duckling on the Serpentine (Mr. C. A. Cresswell tells me this duckling must have been the survivor of a brood of three which he had seen a day or two earlier). Saw a Common Sandpiper by the Long Water.

JULY 13th, saw two Spotted Flycatchers on the edge of the birds' bath in the Hyde Park Sanctuary, and there were some young birds in the trees close by. Possibly they were a family party from the neighbourhood of the band stand.

JULY 15th, saw three broods of Tufted Duck in St. James's Park; they numbered 6, 7, and 10 respectively.

JULY 17th, watched a pair of Dabchicks trying to build a nest on

the water in Regent's Park. Two Coots pulled it to pieces as fast as they built it. The late Mr. Harold Russell told me he saw a Tufted Duck with five young about this date on the lake in the grounds of Buckingham Palace.

JULY 19th, several Swifts over the Long Water, and a Stock Dove calling from an elm close by.

JULY 24th, Mr. C. A. Cresswell writes that to-day he saw a Common Sandpiper in St. James's Park.

JULY 26th, a Blackbird singing in Kensington Gardens. This was the last time I heard the song in 1926.

JULY 29th, a stuffy morning after a night of heavy rain. Thrushes which had nearly left off singing are in good voice again. To-day a Garden Warbler was singing in Kensington Gardens, a late date for this song.

August 12th, a sign of autumn in the return of a dozen Tufted Duck to the Serpentine. For the last fortnight many Willow Wrens have been singing in London.

AUGUST 16th, at dusk my wife and I were in our garden when a Whimbrel passed overhead at some height calling loudly several times. It was clear from the sound that the bird, which was invisible, was flying westward.

AUGUST 19th, a very large number of Mallard ducklings are on the Serpentine. Many of them are even now only a few days old and comparatively few were hatched before the third week in June.

AUGUST 20th, heard and watched a Whitethroat warbling very softly near the Peter Pan Statue in Kensington Gardens. The Gadwall drake is again on the Round Pond.

AUGUST 25th, saw ten Sand Martins fly across the Serpentine towards the S.W.

AUGUST 27th, Mr. L. Parmenter writes that he saw two Common Sandpipers by the Long Water on this date and that he had also seen one there on August 20th. Hitherto the visits of this species to Central London have mostly been in the Spring: but the number of Common Sandpipers to be seen by the various reservoirs in the London area during this July and August was so great that it is not surprising that several of them should have visited our Parks.

AUGUST 30th, heard a Chiff Chaff singing in the Kensington Gardens Sanctuary.

October 8th, returned from my holiday to hear the Chiff Chaff again singing at the same spot.

OCTOBER 30th, saw a Grey Wagtail and a Pied Wagtail running about together on the south bank of the Serpentine.

November 2nd, a party of four Dabchicks on the Serpentine.

NOVEMBER 4th, the Gadwall drake has left the Round Pond and is on the Long Water.

NOVEMBER 14th, a Kestrel flew over Campden Hill.

NOVEMBER 16th, saw two Goldfinches in the Kensington Gardens Sanctuary.

NOVEMBER 18th, heard a Mistle Thrush singing well in Kensington Gardens.

NOVEMBER 22nd, a flock of Greenfinches has been frequenting the Kensington Gardens Sanctuary lately.

NOVEMBER 14th, saw a Dabchick on the Serpentine.

DECEMBER 1st, again watched a Dabchick on the Serpentine, where there were at least ten Common Gulls and two Herring Gulls. Several Redwings on the lawns near Hyde Park Corner.

DECEMBER 5th, ten Pochard on the Round Pond.

DECEMBER 8th, a Redcrested Cardinal, escaped or released from captivity, was in the Kensington Gardens Sanctuary and looking rather miserable. It must be four months since it was first seen in this neighbourhood.

DECEMBER 9th, about fifteen Pochard on the Round Pond and a dozen on the Serpentine.

DECEMBER 23rd, the Gadwall drake has spent most of his seventh autumn in London on the Long Water and has apparently established himself there for the Winter. Hitherto his autumns and winters have been spent almost entirely by the west shore of the Round Pond.

DECEMBER 24th, counted eighty-one Tufted Duck on the Serpentine.

DECEMBER 28th, hundreds of Blackheaded Gulls standing on the frozen Long Water; among them, two Herring Gulls and several Common Gulls. The last named species was until recently rarely seen in London, but during the last few years it has become a regular winter visitor in steadily increasing numbers.

A RARE SAWFLY

SUPPLEMENTARY NOTE (MAY 29TH, 1927)

Two female *P. spiraeae* emerged by May 11th, 1927, from larvae that went into the earth early in September, 1926, and a third emerged a few days later. One of these sawflies, confined with a leaf of *Aruncus* in a lamp chimney, laid 90 eggs, of which 36 were on the dorsal sides of the leaflets. Larvae, the oldest of which were about half-grown, were found on *Aruncus* in the garden on May 28th.

A RARE SAWFLY

Notes on the Life-History and Distribution of *Pteronidea spiraeae*, Zaddach (Hymenoptera, Tenthredinidae)

By J. C. ROBBINS, F.E.S.

THIS paper owes much to the kindness of the late Rev. F. D. Morice, who read a draft of it in 1925, made several suggestions, and generously gave me data from his own observations. I am also much indebted to Mr. L. Nell, Dr. E. Enslin, Mr. K. L. Henriksen and Dr. F. Maidl, all of whom gave me valuable assistance, and to Mr. W. G. Sheldon, who first interested me in *Pteronidea spiraeae* at Limpsfield.

Larvae of this sawfly were first found on *Aruncus sylvester*, Kostel. (*Spiraea Aruncus*, L.) near Munich in 1876 by Kriechbaumer (2); in subsequent years he was unable to find more than a few larvae, but obtained some on *Aruncus* on the banks of the Isar near Munich and some near Rosenheim (also in South Bavaria). Some imagines bred from the larvae found in 1876 were described as *Nematus spiraeae* by Zaddach (1); the larvae were described by Kriechbaumer. The species was placed in the genus *Pteronus* by Konow (3); subsequently S. A. Rohwer showed* that the name *Pteronus*, Jurine, belonged to an entirely different genus of sawflies and proposed the name *Pteronidea* for *Pteronus* as defined by Konow, so that the name of the *Aruncus* sawfly became *Pteronidea spiraeae*, Zadd. In 1899 larvae of *P. spiraeae* were found on cultivated *Aruncus* at Oosterbeek, near Arnhem, in Holland, and several notes and a full account of its life-history, with a good coloured plate, were published by van Rossum (4), who bred the species extensively. Konow (5) gave Austria, without more precise locality, as a country in which *P. spiraeae* was known; Dr. Maidl has kindly informed me that there is in the Vienna Museum a single female *P. spiraeae*, determined by Konow, taken by Mann in 1869 at Raibl, in the Julian Alps; Raibl is now in Italy, but was formerly in the Austrian province of Carinthia, and I think that there can be no doubt but that this specimen was the basis for Konow's record. In 1910 Loiselle (6) found larvae on *Aruncus* in his garden at Lisieux (Calvados), France, and bred females of *P. spiraeae* from them. Nielsen and Henriksen (7) record *P. spiraeae* from near Assens (Isle of Fyn), Denmark. In 1924 the Rev. F. D. Morice exhibited specimens of *P. spiraeae* at the Entomological Society of London (8), having

* U.S. Dept. Agr. Bur. Ent., Tech. Ser. no. 20, p. 98, Washington, 1911.

received them from correspondents in Hertfordshire ; he subsequently found it himself at Woking (Surrey) and saw specimens from Lyndhurst (Hants.), and ascertained that, although never previously recorded as an English species, it has been known to exist in gardens in Hampshire, Hertfordshire and Surrey for at least twenty years. How much longer it may have been present in this country it is impossible to say, but it seems probable that it may have been introduced *via* Holland, with plants of *Aruncus*.

The distribution of *Aruncus sylvestris* as an indigenous plant* is in marked contrast to the known distribution of *Pteronidea spiraeae*, which, except in Bavaria, has not yet been found on wild *Aruncus*, although it is probably attached to wild plants also at Raibl. *Aruncus* is found commonly in woods through Central and Eastern Europe, except along the Mediterranean, in the mountainous parts of Germany and eastern France, in the Pyrenees, in North Italy and Switzerland, Central and Southern Russia, Siberia, Asia Minor, Caucasus, Persia, Himalayas, North China, Korea, Japan, Sakhalin, Kuriles, Kamtchatka and North America. Mr. Morice found that *P. spiraeae* will neither oviposit nor feed on the meadow sweet (*Ulmaria palustris*, Moench = *Spiraea Ulmaria*, L.), a fairly closely allied British plant.

On July 16th, 1925, I discovered some young (first instar) larvae of *Pteronidea spiraeae* on *Aruncus* in a garden at Limpsfield (Surrey) ; by July 27th nearly all had gone into the ground for pupation. On August 20th I found that, in a jar in which two full-fed larvae had been placed with earth and *Aruncus* leaves on July 28th, two female *P. spiraeae* had emerged and laid a number of eggs, one being already dead ; on the same day I saw eggs on *Aruncus* in the open. On August 24th eggs hatched both indoors and in the open ; the larvae that hatched indoors all died, but some from the garden were reared indoors. By September 22nd all the larvae indoors had gone into the earth, and by 26th all in the open had done so.

Two cocoons opened on December 19th, 1925, and one opened on March 21st, 1926, contained contracted but healthy larvae (pre-pupae), from which it is evident that this sawfly, like most others, passes the winter in the larval stage in the cocoon, the hibernating larva pupating shortly before the emergence of the adults in the spring.

From the cocoons made by the larvae that went into the ground in September, four adults emerged in May, 1926, on the 1st, 9th, 13th, and 14th, all being females. The first of these laid 17 eggs on the day that it emerged, and was then killed ; the second laid 105 eggs in two days ; the third and fourth together had laid about 70 eggs by May 16th, when one was dead and the other was killed.

I do not think that these sawflies, although kept indoors (in a cold room), emerged abnormally early, but I saw no sign of *P. spiraeae* in the garden until July, when there were a few larvae on the *Aruncus* ;

* C. F. Nyman, *Conspectus Flora Europaea*, p. 215 ; also suppl. ii, p. 105 ; Oerebro (Sweden), 1878 and 1889 ; Y. Kudo, *J. Coll. Agr. Hokkaido Imp. Univ.*, xi, p. 110 ; Sapporo, 1922.

this was, however, probably because the colony, never a strong one, had been almost or entirely exterminated, and Mr. Morice's experience shows that, at least in some years, sawflies emerging in May produce a first generation in June, so that larvae found in July would be those of the second generation.* In November, 1925, he wrote to me as follows:—"My impression is that even in England the *Aruncus* sawfly must have more than two broods normally in a year. At any rate I am sure that this is the case when the species is bred indoors. This year I found on an *Aruncus* in my garden (planted last year and only just showing above ground) a ♀ on May 19th. I placed her alive in a glass tumbler with leaves of the plant and before she died (on May 23rd) she laid eggs which in about a month (on June 20th-22nd) produced about a dozen ♀ ♀. These again laid eggs—of course parthenogenetically—and from these came larvae, some of which were quite small and others nearly full-fed, when I left for Switzerland on June 16th. I returned on August 16th and found in the above-mentioned tumbler a few living larvae still feeding, but no imagines. Two of the latter, however, appeared on September 10th, and one laid eggs, but I think these came to nothing." It appears, therefore, that under normal conditions there are three generations in England, as recorded by van Rossum in Holland, and further data given me by Mr. Morice indicate that a fourth or partial fourth generation sometimes occurs, at least under artificial conditions. The generations, however, overlap to some extent, owing to the varying length of the larval period, and it is possible that some hibernating larvae do not produce imagines until June or July.

Considering my own data in conjunction with those of van Rossum for the years 1899-1901, it appears that the duration of the various stages, both in England and in Holland, varies considerably according to the season. The eggs are usually laid very soon after emergence, and hatch in from 7 to 14 days. The feeding period of the larvae ranges from about 12 days in warm weather to 30 in cooler weather. In hot weather van Rossum had imagines emerge only 5 days after the larvae had made their cocoons, but probably the period spent in the cocoons by the insects of the spring and summer generations is more often 14 to 18 days. In Holland the period spent by the larva and pupa in the cocoons during the winter appears to be about 6 months, while in England, where the food-plant does not come up in the open before the end of April or beginning of May, the usual period seems to be 7-8 months.

The number of eggs laid by *P. spiraeae* varies considerably, but there is little variation in the manner in which they are laid. In August, 1925, two females in captivity laid, between them, 190 eggs; in May, 1926, one female laid 105 eggs in two days; other eggs were seen in the open. They were laid rather irregularly, but mainly in groups, almost entirely on the ventral (lower) surface of the leaves (in 1926 a

* See also supplementary note p. 10.

single egg was seen on the dorsal surface, see note p. 10). When laid the eggs are whitish and opaque, measuring about 0·75 by 0·25 mm. ; just before hatching they are about 0·8-0·9 mm. long by 0·4-0·5 mm. broad, cylindrical, rounded at each end and slightly contracted in the middle, shining and translucent, and in some the embryo is plainly visible. The leaves on which eggs were laid in captivity became rather dry, and in one case none hatched, while in another about half hatched, but no larvae were reared. Possibly the sensitiveness of the eggs to dryness and their dependence on water-vapour to supply the moisture that is necessary for their growth account for their being laid on the ventral surfaces of the leaves ; for it is on this surface that most of the stomata are situated, so that the humidity is likely to remain fairly constant, owing to the transpiration of water-vapour, which is most active on hot, dry days. The eggs of *P. spiraeae*, being laid on the leaf surface, cannot derive any moisture from the plant juices, as can eggs laid in the leaf or stem tissue, such as those of *Diprion* (*Pteronius*, *Lophyrus*) *simile*, Hartig, in the needles of *Pinus strobus*.*

The larvae of *Pteronidea spiraeae* feed generally on the undersides of the leaves of *Aruncus*, eating irregular holes between the principal veins, and sometimes defoliating the plants. When only two or three days old they are gregarious, and usually hold the hinder part of the abdomen in the air, but later they become more solitary, and the curling of the abdomen is far less pronounced. They have 14 pro-legs, of which the last pair, the anal claspers, is almost absent, six pairs only being fully developed ; the body is cylindrical and tapers somewhat towards the tail. I was unable to determine the number of instars, but the larvae moult at least twice before spinning their cocoons.

Description (about 3 days old) : length about 4 mm., body greenish-white, wrinkled, very slightly hairy, with a green stripe down the back, broken at the eleventh and twelfth segments, and terminating in a darker colour ; thoracic legs whitish, with the claws and basal segments (coxae) brown, pro-legs greenish-white ; head rather large, dark brown above and at sides, pale in front, slightly pilose : (about 8 days old) : length 7·8 mm. ; body bright yellowish-green, with a dark green median dorsal stripe from the second segment to the tenth ; head pale brown with two dark marks between the eyes and the vertex, mouth-parts darker : (about 11 days old) : colouring similar, head less disproportionately large.

The cocoons of my specimens were made in the earth and were brownish-black, slightly shining, containing fragments of peat or sand. They are ovoid, about 8·9 mm. long by 3·4 mm. broad. According to van Rossum the cocoons are at first greenish ; Kriechbaumer recorded that his larvae made cocoons in dead leaves of *Aruncus* and pieces of paper.

The female only of the imago is known ; Kriechbaumer stated that he bred both males and females, but the male has never been found

* F. D. Morice, *Trans. Ent. Soc. London*, 1925. Proc., pp. xxix-xxx.

since, and Mr. Morice believed, for good reasons, that the original record was due to an error.

Description: head and thorax black, except the mouth-parts, pronotum, cenchri and tegulae, which are yellowish; antennae 9-jointed, black, tapering, about as long as or slightly longer than the abdomen; abdomen pale yellowish below, the ground colour almost obscured on the dorsum by transverse black stripes; apex of saw-sheath black; legs yellowish, the tarsi of the second and third pairs and the distal portion of the tibiae of the third pair brown; wings hyaline, stigma dusky brown (this is very unusual in the genus *Pteronidea*), costa paler brown. The antennae, head, thorax, tarsi, saw-sheath and tip of abdomen are finely pilose. Length 6mm., abdomen about 4mm.; expanse of wings 15-16mm.; length of antennae 4mm. (The measurements given by different authors vary somewhat; mine agree fairly closely with Zaddach's.)

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BRITISH WILLOWS

By JOHN FRASER, F.L.S.

Read to the Botanical Section on November 16th, 1926

THE genus *Salix* is the principal one of the Order *Salicaceæ*, which also contains the Poplars, with about twenty to twenty-five good species. At a recent computation the Willows number 160-170 good species, with a large number of hybrids, which make the genus a complicated one for beginners. Enthusiastic students of the genus have raised a large number of minor forms to the rank of species, with the result that I have counted 620 species recorded in the "Index Kewensis" after excluding those which I know to be hybrids. These are distributed over Europe, Asia, and North America with a few in the tropics of both worlds, some in North Africa, one in South Africa, and one in South America, extending as far as Chile.

The British species of Willow number eighteen, which are also native to Europe and Asia, and some in North America, as if they had originated in the temperate and frigid regions of the northern hemisphere. This is substantiated by the fossil *Populus primæra* leaf discovered long ago in the Middle Cretaceous of Greenland, and another leaf, supposed to be a Willow from a corresponding horizon in the Rocky Mountains. In more recent times *Salix polaris* has been found in the forest beds of Cromer, so that Britain has lost at least one native Willow.

Every one of the eighteen British species is supposed to be capable of hybridising with every other, and that would give 144 hybrids, but only 57 binary and eleven ternary hybrids have been found in Britain and described. When one recalls that Willows are diœcious, and that they are entomophilous plants, it will be easy to see how they lend themselves to crossing. Of the 57 hybrids a large proportion are found on the mountains of Scotland, where some of them are endemic, not being found anywhere else. Some are found in the Highland valleys and the north of England and they often extend up the mountains to considerable elevations. The ternary hybrids arise through hybrids being crossed with a third parent. I have collected all the lowland species and hybrids in Surrey, with the exception of the three hybrids, *S. hippophaefolia*, *S. cuspidata*, and *S. stipularis*, so that anyone, who sets about collecting Willows, is sure to meet with some of the hybrids. The species are easy to determine, and after some familiarity with their characters, it gradually becomes more easy to determine the hybrids or supposed hybrids.

I have travelled 20,000 miles, at a low estimate, in collecting the British Willows, by train, motor bus, motor car, and on foot. The journeys were undertaken ostensibly to collect Willows, but incidentally I collected everything else I desired to have, whether lowland or upland. The systematic collection of Willows was due to a mistake I made during the first day I was in the Highlands. On the way to Ben Lawers I picked up what I considered to be *S. lanata*, but doubted the determination before the day was over. When I got home I read that I had been in the metropolis of the British Willows, and next year commenced going to the Highlands twice a year to collect flowers and mature leaves, continuing the journeys for eight years. *S. lanata* was the last species to be discovered, and in the meantime all the British species, many of the hybrids and varieties had been secured.

My system of procedure in collecting is to mark every tree or bush from which catkins or leaves are collected, in order to be certain of finding it again; because if leaves are collected from one tree or bush, and catkins from another, a great deal of unnecessary confusion may be caused. In autumn when a confused mass of bushes is in full foliage the aspect of the surroundings is so different, and memory so short that it is desirable to make a record in a notebook of the exact situation of the marked bush. In this way I have ear-marked 638 trees or bushes, for future collection or observation. From these I have selected and mounted about 400 sheets.

Unless they are growing in proximity, it is necessary to make four journeys to collect the catkins and leaves of the two sexes of one species. Many of the old time collectors were satisfied to collect only one specimen at whatever stage it happened to be, so that these are very imperfect for herbarium purposes or for study. Even the great Linnæus was sometimes guilty of this defect. Another great mistake of the old time collectors was to make one set of leaves do duty for male and female catkins on the same sheet. By this method the leaves and catkins of two varieties or hybrids got mixed. It is excellent practice for a beginner to retain a twig for dissection, when he or she gets home from an excursion. Notes should be made in a book of the number of stamens, the character of the nectaries and their number, the shape of the ovaries, whether glabrous, silky or tomentose, and whether sessile or stalked and the relative length of the stalk to the nectary. If a number is put to each Willow, with a record of its habitat, and the date of collecting, any particular Willow can be localised and referred to for any purpose in future, whether the collector has been able to determine it offhand or not. In due course it is sure to be recognised.

The drying of Willows is easy compared with many other plants. The catkins are the more easy. If the papers are changed three times at intervals of twenty-four hours, they will be dry practically, though they should be left under gentle pressure for a fortnight for the twigs to dry out. The leaves may require changing for five to seven days—much depends on the nature of the weather; but after that the heavy weight should be removed and replaced by a light one for another week

to keep the leaves flat till they stiffen. The narrow leaved species like *S. purpurea* and *S. repens* should not be freely exposed to the air from the time they are cut till put under pressure, because they are liable to roll up or become crumpled, and cannot well be flattened afterwards. Besides their untidy appearance, the margins of such leaves get hidden, and the presence or absence of serratures and their nature are obscured. It has been my custom for many years to carry a large book or album for the purpose of collecting, and this keeps the leaves flat from the first. The leaves are then easy to regulate when putting them between sheets of paper, prior to placing a weight over them. Some of them have to be turned over so as to show both surfaces after they are mounted. The opposite and decussate leaves of Mints are much more troublesome to regulate, and this must be done before they are put under pressure, otherwise they get folded longitudinally and transversely till they are almost beyond recognition, for they are more intricate than Willows in varieties and hybrids.

It is desirable that Willows should keep their green colour when dried, but there are several which turn black or deep brown naturally. They include *S. Andersoniana* (*S. nigricans*) and its hybrids, *S. purpurea* and its hybrids, and some of the forms of *S. repens*. The first specimens of *S. Andersoniana* I collected in the Highlands turned black before I got to Edinburgh, and I concluded they had been fermented and rendered useless, but subsequent collections behaved in a similar way. This character of blackening has its compensations, for it is a valuable aid in determining the numerous hybrids which it makes with other species. Many of those I collected proved subsequently to be *S. Andersoniana* \times *phylicifolia*. So it is with the hybrids of *S. purpurea*, all of which blacken in drying. I collected some of them as late as October, and the mature leaves kept fairly green when dried.

The time of flowering ranges from February in the south of England to the middle of July in Scotland, upon the mountains. Latitude and elevation both have a retarding effect upon the development of the catkins. I was unable to get a single catkin of *S. Andersoniana* on a Mid-Perth mountain by the middle of June, whereas a plant of the same Willow reared from a twig at Kew, bloomed annually between April 25th and May 10th. A sunny aspect will cause them to bloom earlier than one facing the north. In clay soils covered with water the flowering period is unduly late even in Surrey. The nature of the winter has also a marked effect upon the Willows. In 1924 and 1925 it was early enough to commence collecting at the end of March. In 1926 *S. caprea*, *S. cinerea* and the hybrid *S. inbra*, as well as the exotic *S. daphnoides* and *S. pruinosa* were ready for collecting by the last week of February. All this has a considerable bearing upon the time when the collector should commence operations. The males soon shed their pollen and brook little delay; the female catkins last much longer in good condition. When one knows the nature of the soil and the species that grow in certain districts, the time for making a visit can be regulated, if allowance is made for the earliness or lateness of the season. *Salix pentandra* is the latest of the

lowland species to bloom in May and the fruit will even be worth collecting in September, in the north of Scotland.

Old time writers used to state that Willows do not give rise to seedlings, but this must have been due to lack of observation. I have collected seedlings of ten species in the wild state and have seen seedlings of *S. lanata* in addition, but thought it too great sacrilege to uproot so rare a species, hoping that some of them might prove to be hybrids. Plants of *S. Andersoniana* in the garden gave rise to seedlings that bloomed during the second and third year. I have collected seedlings of *S. alba* in two localities in North-West Surrey, where the two sexes occur; but have seen none of *S. fragilis*. That is easily explainable. I have seen only four male trees in Surrey and fear that the last of them has been destroyed by the building of houses and bungalows. The seeds of Willows germinate very quickly under suitable conditions and make some inches of growth during the year of their production. I sowed some seed of *S. repens* in a small greenhouse attached to the laboratory at Kew, and the seedlings appeared above the soil in forty-eight hours. Seeds and seedlings are so small that they must have bare ground and a sufficiency of moisture to germinate at once, or they will perish. They will germinate even on bags of concrete used to build up the banks of rivers. Other places to look for them are recently cleared ditches, railway banks, gravel on the margins of rivers, sand and gravel pits, and the upper reaches of mountains, where the soil is often bare or crumbling.

The cultivation of Willows has its uses and interest in a garden, apart from the making of baskets and other wickerwork, and the cultivation of the bat Willow. About the beginning of this century I found myself giving a different name, each time I passed it, to an old tree that had been cut down to a short stump, which was throwing up branches again. A small twig of it planted in the garden puzzled me for some years till it reached the height of eight feet, when it bloomed and the first catkin showed that it was *S. viridis* or *S. alba* \times *fragilis*. A seedling of *S. alba* planted in the garden got inconveniently tall and was lopped at a height of six feet; it then made branches six to eight feet long in a season. Though a silky-leaved species it will produce glabrous leaves for a year or two when cuttings are planted, or old bushes are stooled. The silky-leaved *S. viminalis* and the hybrid, *S. acuminata* behave much in the same way when stooled or when collected in hedges where they get cut down periodically. Collectors sometimes think they have found something new, but cultivation will soon dispel that notion. One must learn to distinguish between the normal and the abnormal. Many of them are as handsome, or more so for their catkins in spring, than some of the new introductions from China and other far countries. This is strongly impressed upon me when trying to get male catkins, fully expanded, of any male Willow near London, or other centres of large populations. The narrow leaved species make a good substitute for Bamboos. *S. alba* *ritellina* and *S. alba* *britzensis* are often cultivated by the margins of ornamental water for the beauty of their yellow and orange red bark respectively in

winter. *S. alba ritellina pendula* makes as handsome a weeping tree as the Babylonian Willow, with the addition that its long slender branches are golden in winter. When the trees are allowed to grow in a natural way, the hoary leaves of *S. alba*, and the silvery under-surface of those of *S. fragilis*, when turned up by the wind, make handsome and striking objects in the landscape. Far too often these trees are pollarded and fail to show their natural beauty.

CLASSIFICATION.

British Willows are sometimes classified into three tribes, namely, Pleiandræ, Synandræ and Diandræ, but as the last make a large group, including two that have one characteristic different from all the other sixteen, I prefer to make eleven smaller groups of them instead of a synopsis to simplify their determination. The first thing to do is to examine any Willow carefully and then find out the group to which the characters conform.

I. Pleiandræ. Stamens 5, 3 or 2, free; bracts uniformly pale yellow. Catkins on long, leafy peduncles; capsule glabrous.

The above includes *Salix pentandra*, *S. triandra*, *S. alba*, *S. fragilis* and their hybrids. The group could be detected by the pale yellow bracts of the catkins alone. The male catkins fall with their leafy peduncles attached. The bracts of the female catkins fall away soon after flowering.

* Bracts blackened or discoloured at their tips form all the remaining groups except the last; Stamens 2.

II. Pruinosa. Twigs covered with a glaucous, waxy bloom. Catkins and capsules sessile.

This group includes *S. daphnoides* and *S. pruinosa*. Both are exotics, but are introduced here, because of considerable beauty and interest, and often planted.

III. Synandræ. Stamens two, connate, or only partly so in hybrids; anthers four-celled when connate, reddish-purple.

The group includes *S. purpurea* and its hybrids.

IV. Viminæ. Stamens free, or partly connate in hybrids. Catkins subsessile. Styles long. Leaves silky-tomentose beneath.

This includes *S. viminalis*, *S. lapponum*, their varieties and hybrids.

V. Capræ. Catkins before the leaves, subsessile. Ovaries with long pedicels. Styles short or none.

This includes the three very common species, *S. aurita*, *S. caprea*, and *S. cinerea* with their varieties and hybrids.

VI. Argenteæ. Small, creeping shrubs. Leaves small, with silky adpressed pubescence beneath. Styles short or medium.

The group includes *S. repens*, and numerous minor forms at one time regarded as species, then reduced to varieties and now regarded as mere forms. The so-called species described by Linnaeus, Smith, and Wulfen, may still be found and determined, but they are so variable that their determination might be left over till a good acquaintance with the larger and less difficult Willows has been made.

VII. *Phylicifoliæ*. Characters of the *Capreæ*, but styles long and stigmas deeply bifid.

The group includes *S. Andersoniana*, *S. phylicifolia*, and their numerous hybrids. They inhabit the valleys between mountains in the Highlands, and both of them with their hybrids may ascend the mountains, especially *S. Andersoniana* and the hybrids between the two. The two species are closely allied, bloom at the same time, and where they meet on the banks of rivers and streams, bees and other insects cross and mix them up in every conceivable way. There are far more individuals of the hybrid, *S. Andersoniana* \times *phylicifolia* than there are bushes of the true species.

VIII. *Arbusculæ*. Small, trailing or erect alpine shrubs, with small leaves, glabrous, except when quite young. Styles short or moderate, stigmas small, bifid. Ovary densely tomentose.

Includes *S. arbuscula* with its hybrids, and a few unimportant varieties. They are easily separated from *S. repens* and its forms by the glabrous leaves.

IX. *Lanatæ*. Leaves woolly, with long hairs when young. Catkins large, densely covered with pale yellow, silky hairs. Ovary glabrous, style long.

Includes *S. lanata* and its hybrids. A rare Willow in Britain, confined to Mid-Perth, Forfar and S. Aberdeen. Very different from every other British Willow, and easy to recognise. The hybrids are more difficult.

X. *Nitidulæ*. Leaves small, green and glossy on both sides. Stamens with pale purple filaments and purple-red anthers. Ovaries pubescent, style long.

An alpine group including *S. myrsinifera*, a few unimportant forms, and several hybrids. The glabrous and glossy leaves of this species give a gloss to those of its hybrids, and thus one of the parents is indicated. A bush of the male plant in full bloom is very handsome as it stands up or juts out from the rocks amongst which it grows. Opinions are divided whether the catkins of this or the yellow ones of *S. lanata* are the more beautiful.

XI. *Terminales*. Catkins solitary, terminating the branches.

The group includes *S. herbacea* and *S. reticulata*, with their hybrids. They differ from all other British Willows in having terminal catkins. The other sixteen species throw off the growing point with its undeveloped leaves at the end of the growing season, and their catkins must necessarily be lateral. The only exception to this is due to a second flowering during summer. *S. triandra* often behaves in this way. *S. undulata*, which is a hybrid between *S. alba* and *S. triandra*, blooms in April and May, when it has lateral catkins and glabrous ovaries. It often blooms in July when one catkin terminates each branch, and the ovaries are pubescent on the upper half. This is a peculiar phenomenon, because both the reputed parents have glabrous ovaries.

S. herbacea is the smallest British shrub. It often occurs on exposed and windy parts of mountains where no other vegetation can exist. The branches ramify under the stony soil, and the tips appear just on the surface, carrying three leaves as a rule, and one tiny catkin nestling amongst the leaves. *S. reticulata* is a squat little bush with rigid branches, and is easy to recognise by its leathery leaves, netted with wrinkles above, and with corresponding depressions beneath.

A STOAT AND HER FAMILY

By JOHN E. S. DALLAS

RAMBLING one evening last June through some hilltop woods in Kent, my wife and I came upon a shallow trench, dug during the war, and lined with interlaced hazel. As we approached, we saw a large brown object moving over the low herbage near the farther rim of the trench. By cautious movement towards it, we were able to see that it was a stoat carrying on its back three young ones, while four others ran closely by its sides.

On hearing our steps the parent stoat turned and caught sight of us, then dashed back at full speed along the margin at the top of the trench, the three youngsters still clinging to her. At this alarm the other four dropped into the trench, where we saw them trying to dig themselves, hind-parts first, through the interlaced hazel into the light earth of the trench.

We awaited events. Presently the old stoat came back—this time along the trench itself—to within five feet of us, called to her young, one of which crossed to her in front of us. It was at once seized by its neck, and hanging limply, was dragged hurriedly along the trench.

We again waited breathlessly. In less than two minutes the devoted mother was back, called again, and another youngster crossed the trench to the unceremonious safety of its parents jaws.

We still waited, but no further dramatic events took place. Meanwhile the two young stoats which were left, had dug themselves well into the sides of the trench, and my wife, her hands covered with leather gloves and handkerchiefs, tried to eject them with a stick from behind. They were forced to the mouth of their burrow, and I only regret that my "snapshot" was foredoomed to failure in the waning light and in the dark wood, for the youngsters bunched their claws up to their muzzles, showed their tiny teeth and hissed at us like fiends incarnate.

We may think of the stoat as a bloodthirsty villain, but this example of maternal courage turned into quick and resolute action under the very noses of the little animal's arch enemies might well have stood as a pattern for the men who were trained in this very trench.



NEST AND EGGS OF GREATER BLACK-BACKED GULL

Isles of Scilly

Greater Arthur Island. June 12th, 1926.

Photograph by Miss C. Longfield.



SOME PROBLEMS OF BUTTERFLY MIGRATION

By C. MELLOWS, M.A., F.E.S.

TILL a few years ago scarcely anything had been written about the migration of insects, though the fact that butterflies, like birds, do migrate at times was known long ago. Our ancestors were little interested in butterflies and their doings. There is no literary tradition about the wanderings of the Painted Lady or the Clouded Yellow, such as the romance of Philomela or the travels of the stork and the swallow supply to the languages of half the nations of the North. Yet if a butterfly is to many a trivial or an inconspicuous object, a butterfly at sea is a challenge to the imagination, and a flight of butterflies on their travels is something to remember. So we find in chance records as early as the middle ages, that butterfly clouds have excited interest in several places in southern and central Europe. There is a quaint legendary tale of a battle checked by a rain of butterflies, and a most picturesque record in Holinshed's *Chronicles* of a plague of Cockchafers at Gloucester in a time of snow. Superstitious terrors have been evoked by insect hosts that "drizzled blood" or darkened the sun. The wanderings of the locust-hosts are recorded very early in the annals of their victims, and no wonder. But observers in earlier days merely saw and marvelled: they seldom recorded, and it occurred to no one to devise an explanation of the unusual sight, unless to suggest rather quaintly that butterflies like other devout persons, "seken straunge strondes and ferne halwes," taking the path to Rome, or the pilgrim's way to Mecca.

In the tropics where butterfly swarms are more familiar they have been put to strange uses. Their seasonal migrations serve as a sort of Shepherd's Calendar; weather prophets predict by the coming of the butterflies, while the credulous find in them signs and portents. But with ample scope for observation has gone no readiness to reason or enquire.

So to the naturalists of the present generation has been left a puzzling problem, or rather a series of problems of an equal fascination and complexity. Here are a few of the questions that we can ask without any certainty of finding a reply, as we see and record the visits of our English migrants.

Where do the insects come from? How do they contrive to come so far and to fly so long? Why do they come? Can we find any evidence of purpose, of a sort, in their travels, or is the visit a mere chance affair? Do they follow blind impulse, an instinct for the preservation or improvement of their kind, or are they merely the victims of

circumstances and playthings of the weather? If there is evidence of purpose in their coming, have they come to stay, or like most of the birds to return? Is migration related to the normal dispersal of animal forms, or something distinct, and playing a separate part in the evolutionary process? What is the 'good' of Migration?

Hardly any of these questions can be answered confidently at the present time. But readers of the "Entomologists' Record" (1900-1902) and of Mr. C. B. Williams's articles in the "Transactions of the Entomological Society" during the last few years (and especially in 1923), will find that they have at least been asked in a fascinating as well as a scientific manner. And something has been done to clear the ground by rejecting theories, which modern observations can definitely disprove. But as we reject one theory to fall back on another, a suspicion gains ground that we are trying under one heading to deal with several utterly different phenomena.

The present article is a summary of a lecture delivered on November 3rd, 1926, to the London Natural History Society, attempting to discuss the question from the point of view of the all-round naturalist rather than the specialist, and to show into what curious and interesting by-ways the enquiry leads. In a lecture given extempore or from notes it is easy to be digressive and suggestive without reproach, but to reproduce one's numerous digressions is to make strange reading. I borrowed freely with imperfect acknowledgment both in illustration and in argument. I could hardly do otherwise without being very tedious. So in following the general outlines of the lecture I have used other men's arguments as my own, without encumbering the article with a detailed list of references to the works in each case consulted.

Interesting controversial matter will be found in "Nature," 1925, the "Entomologist," November, 1926, the "Journal of Experimental Biology," 1924, the "Entomologists' Record," 1902, etc. I have not been able to consult the German literature on the subject; no doubt it is very complete. The Americans seem to be faced with quite different phenomena from those on which we base our theories in the west, and their views are unlike ours.

The year 1926 might be described as a migrant year in this country. Of butterflies we saw *Pyrameis cardui* in great numbers, and that rare visitor *Lampides baeticus* made its appearance on the south coast. The limited numbers of our own native *Pierids* were greatly reinforced by a large migrant swarm from overseas in July and early August. Moth collectors in the favoured district of Cornwall and South Devon found a larger number than usual of both regular and occasional migrants such as *Caradrina exigna*, *Leucania unipuncta*, *Heliothis armigera*, *Sterrha sacraria* and others. Among various records of migrants caught in South Devon in the autumn is one of unusual interest. Mr. P. P. Milman caught at sugar a specimen of the very rare *Thalpochares ostrina* var. *carthami*. It was in perfect condition and had presumably just emerged from the pupa. I am not clear whether a further record in the January "Entomologist" refers to the same or to another

specimen. But in either case a brood was probably raised from eggs laid in South Devon earlier in the summer. Its larva feeds in the stalks of thistle or of *Helichrysum*, and is very unlikely to be imported (as may *armigera*) by accident.

Now where did it come from, and how did it come? It came not less than 500 miles, perhaps much further, for like *S. sacaria* it is almost as rare in central Europe as it is here, and its real home is the Mediterranean. How can so small and fragile an insect have travelled so far?

A suggested answer to this question is given by Dr. E. P. Felt, writing in "Nature" two years ago. He says it is not a proper migrant at all, but has drifted here willy-nilly with the wind, "carried by the higher velocity of upper air-strata, gaining these by the aid of convectional currents arising from heated earth surfaces, now known to extend to a height of at least a thousand feet above the land surface." So an insect or its parent, flying about in a district perhaps just north of the Sahara, suddenly found itself lifted high up in the air, and carried swiftly northward by a strong south wind, to be dropped exhausted when it could fly no longer, or to be carried downward by another convectional current as the air chilled by contact with the cooler surface of the English Channel. It came in mixed company, for presumably moths and butterflies and other insects were carried to us in that same stray wind.

This is a simple theory and will commend itself to many. Small insects are doubtless carried long distances by the wind. Mosquitoes have been recorded at lighthouses far out to sea, when strong land breezes were blowing. Gossamer spiders have been found floating at very high altitudes, their parachutes propelled by the wind as readily as dust or thistle-down. Travellers in the desert have found aquatic insects, and domestic parasites like the house-fly carried as much as fifty miles from cultivation. Insects of several species reappeared on devastated Krakatoa not long after every living thing had been destroyed. Most interesting of all is the evidence of the Oxford University Expedition to Spitzbergen in 1924. On the ice desert of North Island they found in several places many miles apart specimens of a black aphid (*Dilachnus piceae*) and a hover-fly (*Syrphus ribesii*) which could be shown to have travelled at least six hundred miles in a southern gale, which was blowing at the time, in order to reach the island. When first discovered on the snow they were fresh and lively after their long journey, but in a day or two all found were dead: and soon all were covered with snow. This was an extreme instance, well-authenticated, of involuntary 'migration,' or perhaps we should say involuntary transport, by the weather.

There is another feature of Dr. Felt's theory familiar to all observers who travel in the high mountains. Our well-known migrant friends *P. brassicae* and *rapae* may be seen at times in the Alps acting in a most unaccountable way. On a very warm and calm day in August I stood and watched specimens of *brassicae* mount vertically in the air, thousands of feet above the Glacier du Trient. They passed close by

me and any wind there was seened so light as to be almost negligible. In early April of the cold and backward season of 1924, I recorded a fresh and lively specimen of *P. brassicae* flying above deep snow on top of Monte Marto 7,000ft. in the Alpes Maritimes. Crossing the great Arolla Glacier in bad weather in September, 1923, I saw many Pierids of both the common species, living half-frozen on the ice in places about 9,000 feet above sea-level, to which they could scarcely have been carried by any other way than by a direct descent from still higher altitudes.

English observers living on the sea-coast expect migrants when the wind is in a certain quarter at certain times of the year. Thus Devonshire and Cornish migrants are said to arrive in early June with a south-east breeze. Entomologists who have studied the weather conditions when migrants arrive, tell me that this is the case, and expect certain butterflies from the sea with a sea breeze. It is not easy to fit in this belief either with Dr. Felt's theory or with those of his opponents. It is conceivable of course that butterflies descending on the cool Channel might finish the rest of their journey on the surface-level with a sea breeze. But it seems at least as likely that they came all the way across the sea at the lower level, and Dr. Felt has ignored the immense amount of evidence of those who have seen swarms flying at sea level far out to sea (e.g., 500 miles West of Sierra Leone in the face of a sea breeze, or long distances from Trinidad, or in the middle of the Mediterranean). On a ship thirty to fifty miles from the coast of Egypt were seen or caught on April 27th last year. *P. cardui*, *L. boeticus*, *Deiopeia pulchella*, *Plusia gamma*, *Agrotis upsilon*, and *C. exina*. This evidence (of Mr. C. B. Williams) is extraordinary. Every one of those insects is a notable migrant, and several of them, especially *upsilon* and *gamma* were extremely abundant immigrants on our own south coast the same summer. He justly asks if it is likely that even if the wind were south and violent (and it was neither) these insects would be picked out of all the insects abundant in North Egypt in the spring, for an involuntary voyage to northern regions.

The theory of insects being conveyed northward on upper air currents is moreover not merely based upon an unproved assumption that such currents exist. It is actually contrary to the meteorological records of Egypt and the Mediterranean, so far as they can be given, for currents at all heights above sea-level. During the migrating period the surface wind blows steadily from the north, and the wind at higher levels is from the west. At no level is it such as to transport butterflies involuntarily in a northerly direction. Thus we are led to two conclusions: first that insects flying with the wind are more likely to do so at low levels, secondly, that much movement is actually against the wind. We cannot possibly agree with Dr. Felt that, "Determinate flight is a comparatively small factor in promoting the spread of insects." A fair survey of the evidence leads rather to the belief that among butterflies at least involuntary migration is the exception, not the rule. To state this is, however, to use both terms 'voluntary' and 'migration' in an inexact sense. In one sense migra-

tion must be *ex hypothesi* voluntary, in another the flight of insects can hardly be called voluntary at all.

In the following quotations chosen from several hundreds available, the observer discusses a form of flight independent of the wind or contrary to its direction. The first is from Mr. Mitford's observations in the "Zoologist," 1895, on the flight of butterflies in Ceylon.

"In November at Colombo a strong north wind blows daily along the sea coast, at which season clouds of white butterflies appear, flying in a continual stream extending far inland for days and weeks. They fly from the south and in the eye of the wind, and the stronger the wind blows, the more rapid their flight. I never witnessed this without the greatest astonishment. The locust with its strong body and powerful wings cannot beat against the wind but drifts with it, yet that a butterfly, with a body so slight as scarcely to give a fulcrum for the wings to bear on, and with wings offering so broad a surface to the breeze that one would expect to see it drift like a snowflake, should possess the faculty of propulsion against a strong wind gives us a clue to an aerostatic principle with which we are not yet acquainted."

Miss Cummings in a book called "Two Happy Years in Ceylon" says, "One of the mysteries of the isle is the annual migration in November and December and at intervals up to February, of myriads of butterflies in vast flights. Whence they come and whither going none can guess. When the stormy N.E. Monsoon blows strongest these delicate insects force their way against it."

Mr. Hudson in his "Naturalist in La Plata" gives a remarkable account of the swarms of the big dragonfly *Aeschna bonariensis* seen on the Pampas and in Patagonia. "The really wonderful thing about them," he says, "is that they appear only when flying before the south-west wind called the Pampero, a dry cold wind of great violence blowing from the interior of the Pampas. It bursts on the plains suddenly, lasting some ten minutes, and is most frequent in very hot weather. In summer and autumn the large dragonflies appear not with the wind, but in advance of it, and as these insects are not seen in the country at any other time, and frequently appear in seasons of prolonged drought when all the marshes and water courses for many hundreds of miles are dry, they must fly immense distances, flying before the wind at a speed of seventy to eighty miles an hour. At times they go by like a flash and instantly disappear from sight: but generally they appear ten minutes or so before the wind arrives. In the expressive vernacular of the Gauchos, the large dragonfly is Hija del Pampero, son of the south-west wind. All journey in a N.E. direction and not a single insect ever returns." He goes on to describe the insects as displaying intense terror, and says that those few which settled in woods and plantations on the way clung on for dear life.

If Mr. Hudson is right in all his facts, either the insects started with a swift wind and completely outstripped it in speed, or else their flight was from the first independent alike of force and direction of the wind, and was merely a panic flight due to the coming of the Pampero.

But whatever the origin of their migration, it is an entirely different phenomenon from drift with a stray wind.

Migration as we understand it may take various forms. Sometimes insects are found assembling in vast numbers, just as the swallows assemble for the autumn migration, or as the young starlings flock in late summer, though it would be difficult to say whether their purpose is the same. Large flocks or clouds of insects may be seen flying in close formation, or insects of one species or more may be seen flying in little groups of three or four, or even singly, in one direction, the whole flight extending perhaps over many miles, and taking days to pass one definite point. The behaviour of migrant insects, again, like that of migrant birds, is not always uniform, though it is commonly marked by a strange purposefulness and persistence. A very curious form of migration observed by Mr. Williams in Central America concerned *Calpodes ethlius*, the West Indian Skipper. They were described as flying in thousands south-east or east at a great speed in hazy, windless and almost sunless weather. Those caught were all females. The peculiarity of their flight, apart from its speed, was that it changed direction; they were estimated as exceeding a speed of twenty miles an hour.

An account of observed migration would be incomplete without the following, first recorded in "Nature" in 1879 and quoted in the "Transactions" of December, 1926. The observer, Mr. S. B. Skertchly, was residing in the Sudan.

"Some at least of the swarms of *V. cardui* originate in Africa, one of which I witnessed a day's march west of Sowakin in Nubia in March, 1869. Our caravan had started for the coast, leaving the mountains shrouded in heavy clouds, soon after daybreak. At the foot of the high country is a stretch of wiry grass, beyond which lies the rainless desert as far as the sea. From my camel I noticed that the whole mass of the grass seen seemed violently agitated, although there was no wind. On dismounting I found that the motion was caused by the contortions of pupae of *V. cardui*, which were so numerous that almost every blade of grass seemed to bear one. The effect of these wrigglings was most peculiar, as if each grass stem was shaken separately, as indeed was the case, instead of bending before a breeze. Presently the pupae began to burst, and the red fluid that escaped sprinkled the ground like a rain of blood. Myriads of butterflies limp and helpless crawled about. Presently the sun shone forth and the insects began to dry their wings, and about half an hour after the birth of the first, the whole swarm rose as a dense cloud and flew away eastwards towards the sea. It was more than a mile long and its breadth exceeded a quarter of a mile."

In this connection we can answer one of the questions naturally asked by an English collector about our immigrants—where do they come from? There is clearly no one district which is the birthplace of all our migrant swarms. They will come from those districts where the butterfly population is unusually large and, in some cases at least, where the larval food-supply is inadequate. There are some places

where these conditions often recur, such as the Nile basin, the Atlas foothills and the districts north and west of the Euphrates basin. These act as a kind of reservoir from which butterflies from time to time overflow. The same conditions which may induce migrating in one of these districts may act as potently in others as well, and the swarms may get to work simultaneously. They may even mix. The impulse to wander is perhaps inherited, and a swarm that has started to migrate will often lay eggs at an intermediate stage in the migration, the resulting insects continuing their parents' wandering that has been thus interrupted and pursuing the same direction as their parents, after two months' delay. Migrants may therefore come to us from the original 'reservoir,' or from a point midway between that district and our own.

While local migrations in our islands are not uncommon, as records in the distribution from year to year of such insects as *P. U-album*, *Euphois occulta*, etc., seem to suggest, it may safely be laid down that nearly all the insects coming overseas to us come very long distances. Exceptions may be perhaps *P. brassicae*, *P. rapae* and the Scandinavian race of *Vanessa antiopa* which from time to time have visited us in large numbers. There is another well-known peculiarity about our rarer migrants, and that is that several of them, such as *C. exiqua*, *H. armigera*, *L. unipuncta* and others are a plague in many parts of the world, while quite unable to thrive in our own country. Conversely it is true that some of our insular species, introduced to countries overseas, such as New Zealand and some Polynesian Islands, thrive exceedingly at the expense of local insects and become a nuisance.

How do the immigrants come to us? The question is not easy to answer and any reply must be controversial, but on a fair survey of the evidence we believe they come independently of the wind as a rule, flying low, and in a head-wind, very near the surface. The fact that butterflies have been often caught far out at sea suggests that, like day-flying birds, they may change their habits under the influence of migrating impulse and travel by night as well as by day; and several well-known migrant butterflies, such as *P. cardui* and *atalanta*, have been caught at night, flying round gas lamps or at lighthouses. But as a rule they fly by day only. Their oversea migration is made much easier by a trick some butterflies have acquired of settling on the water without wetting their wings, and "taking off" from the wavelets. This habit, well-authenticated in the case of some Pierid swarms, can hardly be practised except in fine weather and on calm seas, and the discovery of large numbers of drowned insects (as of *Vanessa antiopa* on the Northumberland coast in 1872) shows that if indulged in too often it leads to disaster. Examination of newly arrived migrants shows that many, but by no means all, show traces of exhaustion. Some of the swifter-flying insects disperse rapidly as soon as they reach this country.

Next we shall discuss the composition of migrant swarms. They are commonly mixed, and often contain a number of "accidental"

arrivals of other species, attracted by a well-known imitative instinct which draws insects on the wing after the swarm. Mr. Sanderson's Malay swarm of *Delius ninus* and *Pyramus* quoted below, contained not only moth mimics of these insects, but mimics of the mimic species. An observer records (in Tutt) a swarm of white butterflies accompanied by an *Aeschna* dragonfly which preyed on the insects, and by the small *Apanteles* parasite as well. Some migrating hosts are composed largely of females, in others the sexes are about equal in number, while an extreme instance is quoted by Tutt where Herr Gätke on Heligoland records vast numbers of *Hyperia defoliaria* and *aurantiaria* migrating. The female of this species is wingless, and if the observer was right, here there was a swarm of males. An involuntary migration of the type described by Dr. Felt would presumably contain all sorts of insects in more or less equal numbers. We do not appear to get "mixed bags" of this kind.

The comparative ease with which insects appear to cross the sea enables them to approach our coast at many places other than the traditional crossing-places from the continent, and there are few counties along the south and east coast where migrations do not occasionally take place. The writer has seen newly arrived flocks of *P. atalanta* in the Isle of Wight and of *C. croceus* in Norfolk. *P. rapae* has been recorded coming in from the sea in North Lincolnshire. *V. antiopa* when it arrives is as likely to appear in Scotland as in north east England, and some seasons odd specimens are uncommon in Scotland. *Auosa plexippus* was recorded in south west England, but its liking for the potato lockers of ships, to which Mr. Frohawk refers in his book, rather detracts from the interest of these occasional appearances. In fact in all our migrant records the possibility of accidental introduction cannot be altogether left out of account. A very interesting record in the arrival of *C. croceus* is that in one year it was abundant in south-west Ireland and hardly recorded at all in other parts of the British Isles. *C. croceus* is a common insect in Portugal and the Canaries. Some insects on reaching our shores travel far inland: thus, in a good migrant year *C. croceus* and *P. cardui* will be recorded from almost every county in Great Britain up to the far north. But others appear to lay their eggs on the very edge of the seashore; and the sea coast of Devonshire is undoubtedly the best place to find migrant *Heterocera*.

Although migrating birds and insects not infrequently come under the same weather conditions, and in company, there is no real parallel between the migration of birds and that of butterflies. The former come and return at well defined seasons, some of them making the British Isles their farthest limit and others passing through our country on their northward journey. Insects, on the other hand, have no return flight. The original migrants live only a few days or weeks, and their offspring make no attempt to fly back, as do the birds to their southern home. It has been suggested that the American *A. plexippus* flocks in the autumn, like the swallows, to fly south, but there is no reasonable

evidence of a southward flight, and butterfly flocking appears to be a distinct phenomenon as often as not unconnected with migrating.

Few if any of our immigrants have any chance of staying and living in England. The condition which leads to over-population and a resultant migration, is the same in many species. It is many-broodedness, or continuous-broodedness, a habit which in our own climate is fatal. *C. crocens* sometimes hatches two broods and the later emerged insects may be taken in the sheltered south west as late as Christmas or even mid-January, but these always die without breeding. Our winter is too cold and wet for the larvae. *P. cardui*, which is equally unsuccessful, is generally killed as an imago because it has never learnt the trick acquired by *V. urticae*, and apparently partly acquired by *P. atlanta*, of hibernation. Some insects are doomed to fail because they have come where there is no food-plant. *D. plexippus* has often made its appearance where there was no *Asclepias* for its larva. On the other hand, *P. moneta* managed to establish itself generally in this country where the habit has grown up of planting *Delphinium* and *Aconitum* commonly in our herbaceous borders. I have never heard a satisfactory reason for the failure of *V. antiopa* to live here; on the other hand, there appears good evidence that it was a native here and died out.

The greatest difficulty that a migrant insect must meet in England is the variation in English winters, some of which are far too cold for southern species, while others are still more deadly in their combination of cold and damp. Our temporary spells of fine warm weather, such as often entice out *V. urticae* and *G. rhamni* during January, are particularly treacherous to all insects that are not fully acclimatized to the peculiarities of our weather. Even if a series of very favourable winters in a favourable locality bred a half-hardy local race, the partial immunity which it had acquired would from time to time be in great danger of being lost, as its stock was mingled with the migrant swarms of southerners that come over year after year only to die.

On the other hand it must be admitted that two insects at least, *Hypolimnas bolina* and *Danais chrysippus* have within recent years succeeded in crossing the sea and establishing themselves in a new district where now they flourish.

In deciding how butterflies migrate the question must naturally arise how far their flight can be explained on a mechanical basis. Loeb has shown in his experiments on the robber-fly that insects react mechanically to the rays of sunlight, in the position they take up when they settle. May we say something of the same sort in their reaction to wind and temperature? Do they react positively and negatively to wind currents as certain fish, the salmon or the eel for example, react in the course of their migrations to the flow of rivers and the tides and currents of the sea? Young eels as they disperse to their feeding grounds are content to follow passively the surface currents of the Atlantic that lead them to the Baltic or the Mediterranean or the coasts of Western Europe or Eastern America, and breeding eels descend, always with the stream, from the rivers and headwaters where

they fed, to seek the spawning grounds and the ocean-abysses where they will spawn and die. For the greater part of their wanderings they follow the line of least resistance. Very different is the behaviour of the salmon as they mount the rivers to spawn. Streams and currents are to them a kind of challenge, an obstacle to be fought and surmounted. It is said that a spent and exhausted salmon will descend the stream tail first, feebly fighting the current that takes it to the sea.

The contrast between the two fish would seem at first sight complete: but probably this is not really the case. The movements of both are largely determined by physiological changes inside them. Thus the salmon in going to the sea to feed grows healthy and fat. As it stores fat its specific gravity is reduced and it is forced to leave the salt water for a fresher and less buoyant medium. It makes its way instinctively, and even fights its way, towards the richer supply of oxygen which has become a necessity for it at a certain stage in its development. It has a nerve mechanism responding to the temperature of the water in which it lives, and thus a rise of temperature without will increase chemical action within and so increase the speed with which the fish responds to other stimuli, such as the change of density in the water and oxygen content.

Butterflies, like fish, are stimulated to migrating activity by a rise in temperature, and some species seem to wander in search of an optimum temperature, their wanderings corresponding to some extent with periodic changes of climate. Thus the winter temperature of North Africa is normally suited to *P. cardui*, and in a typical winter the species will increase rapidly and send out swarms in spring to southern Europe, while later in the year the butterfly can accommodate itself to the summer climate of northern and central Europe. But a cold January in Africa completely checks their development, and after such a setback there is practically no attempt in the spring to extend their range. In 1925, after a cold spring in Africa, there were few *P. cardui* in Europe, while in 1926, weather conditions being favourable, the insect was to be found everywhere in the summer.

Butterflies can stand great heat, but they cannot get on without moisture. In the tropics, where seasonal winds blow steadily for long periods, a strong breeze blows into the hot and dry areas from cooler and moister regions. So in order to be carried to an area where famine conditions for the larva will not prevail, an insect must fly steadily in the face of the wind. On the other hand, where the winds are hot and dry the butterfly will do the best for itself and its species by flying with the wind or perhaps diagonally across it. Butterflies perhaps seek an optimum moisture and air pressure as well as an optimum temperature. It has been suggested that barometric depressions affect their migrations: and it is highly probable that electrical disturbances encourage them.

Observers in Panama, East and West Africa, Ceylon and New Guinea have all reported numerous instances of butterflies flying in

large numbers in one direction, and it is clear that where wind conditions are uniform the insects will show great uniformity in the direction and the periodicity of their flights. But their direction bears no fixed ratio to the direction of the wind. A few have been reported flying with the wind, a larger number as flying against a moderate breeze, and the majority have been seen flying across wind. Butterflies have been seen flying directly out towards the Atlantic from South America, and others flying in apparently from the Atlantic. But in both these cases their flight seems to have been deflected by a shifting of the wind. In this connection Dr. Gough's notes on the flight of locusts are interesting. "In a gentle breeze," he says "they fly directly up the wind. In a moderately strong wind they change their direction relative to the wind and fly at right angles to it, while as the wind-velocity increases, their line of flight is turned more and more until we find them flying down the wind when a gale is blowing." He believes that they "turn one flank to a rising wind, and the other to a falling wind." It seems likely that many butterflies will thus tend to respond quite mechanically to variations in wind force and direction, though this is an entirely different thing from their drifting passively with the wind.

There are several remarkable instances on record of butterflies reversing their migratory flight in the course of the day so as to fly to and fro without making any progress in their travels. An observer in the trenches before Gaza in April, 1917, who had a good opportunity to make accurate observations on several successive days, records *P. cardui* flying in batches of 5 to 12 N.W., into cultivated land at 9.30 a.m., and returning in the same formation but in somewhat diminished numbers about 5.30 p.m., flying S.E. towards the desert. This they did for about a week. Conditions in Palestine are very suitable for this trapping of migrants. The weather conditions are almost every day the same. A N.W. sea breeze blows about 9.30 for eight hours, and is followed by a land breeze blowing in the reverse direction for most of the night. From 7.30 a.m., the air is windless and very hot. Under very similar conditions an almost identical to and fro migration of *Belenois mesentina* was recorded some years later. Similar conditions prevail in Selangor of the Federated Malay States where a curious to-and-fro migration was recorded in March, 1920. In this case the insects flew Eastward in a long straggling line for an hour and a quarter in the evening, returning in the same straggling formation thirteen hours later. They continued to fly to and fro for a fortnight.

In each instance it seems pretty clear that the direction of the butterflies' flight was determined and maintained by a sensitive reaction to the wind current, and as they reached a locality where morning and evening breezes blow with equal force in opposite directions, they wandered to and fro without passing out of the district.

It remains to be seen whether a physiological reason can be given for the flight of the insects, as for the migration of fish to and from the sea. In this connection it is interesting to note that just as the breeding eels store fat to sustain them on their ocean wanderings, so

several species of migrating butterflies show traces when dissected of enlarged fat bodies, which the insect does not normally possess. We are not justified, however, in pressing the analogy, for very many butterflies show no signs of this fat, but on the contrary both sexes seem quite normal.

We have finally to outline some theories on the 'good' or 'end' of migration. The extraordinary persistence with which some butterflies seek to extend their range, and the great vigour of some of the well-known migrant strains, suggest that migration has a purpose and is definitely useful to the species. But when we ask why butterflies migrate it is not so easy to find an answer. Some insects seem to be always on their travels, while others go abroad but rarely, and then either at long distance periods or under some special strain. We might suppose migration to be a device to secure cross breeding, like the second cast of the honey bee, or the odd wanderlust of *Arctiid* larvae about to pupate, and the selective egg-laying of *Papilio machaon*, but there is very little evidence in the behaviour of migrant females to support this view. Some finish their wanderings before the eggs are developed, others "seem possessed with the one insane desire of getting rid of their eggs with the utmost expedition, and then madly continuing their flight." Others like *Catalpodes ethlius* do appear to lay their eggs continuously as they go from stage to stage of their northward journey. There is a little evidence, but not much, to support the theory that migration is a device to correct inequalities in the numbers of the sexes. A preponderance of males or of females is certainly dangerous for the species, and from time to time these inequalities do occur. In some swarms there is a very prominent male or female element, and some, as we have explained, are of one sex only. Those who suggest, on the other hand, that insects migrate to escape their natural enemies, whether insects of prey or parasites, must explain several awkward facts. As flocks of birds are often followed overseas by hawks and owls, so insect swarms are accompanied by insectivorous birds and insects, which take toll of them as they go. It is obvious that, starting life as an emigrant under new conditions, an insect will have a hard struggle and has foregone much of its natural protection.

Others have conjectured that just as a swallow, with its need of an unlimited insect diet during the breeding season, is led to explore summer areas where insects abound, so will butterflies go far afield under pressure of 'hunger' to find new food supplies that only an unusual effort could enable them to reach. The word 'hunger' must of course be modified. A migrant butterfly is not hungry at all. Like the swarming honey-bee or the locust, it is well-supplied with food for the journey, and perhaps we should describe the stimulus rather as "maternal instinct." But any observer who has watched *C. croceus* and *hyale* scattering among the fields of clover and lucerne, will feel how strange is the impulse to seek new and unexplored food areas for their offspring.

Much less probable, in the case of insects at least, is the 'homing' theory which supposes that the swallow and the cuckoo return every

year to breed in their old home in the north where once they lived all the year round and from which they were driven long ago by a change of climate. In the butterflies there are obvious differences. They do not fly south for the winter. They follow no uniform rate in migrating. They can hardly be said to show any trace of inherited memory. Besides the problem is utterly different for them. A swallow cannot hibernate or pupate or "lie over" for the winter. It must go where food is or starve. So the swallow goes south in autumn to the district of the longer days and the brighter sunlight where food abounds: while the sparrow has solved in its own way by a change of diet the problem of feeding summer and winter alike in northern latitudes. The butterfly has relatively few requirements. In the larval stage in many species it can feed by day or night and has little need of sunlight. As a pupa it can stand prolonged and intense cold. But few species can change their diet, and the more delicate insects fail to live in our northern latitudes simply because they cannot modify their breeding habits so as to remain nine months instead of three weeks as ovum or pupa or hibernating larva. It seems highly improbable that an insect once living here has changed its way of life to accommodate itself to conditions in the south and cannot change it again.

Lastly we have the "hunger swarm" theory. Mr. Elton in a very interesting paper on "Periodic Fluctuations in the numbers of animals, their causes and effects," has shewn that in certain parts of the world, where meteorological conditions are relatively simple to study, such curious events as lemming swarms and plagues of mice may be shown to follow periodic changes of climate corresponding to sunspot activities. He shows that a sunspot cycle of 11.2 years is much in evidence in the growth and reproduction of plants and animals, and he is able to calculate and foretell fat and lean years among some animals and birds with some accuracy. The migrations of Pallas's Sand-grouse, which lives in central Asia and in some years reaches this country, are said to confirm this theory. Such periodical changes might operate in two ways to produce migration. Very favourable climatic conditions would lead to an excessive increase in the numbers of the animal, and over-population would lead to a hunger swarm. This is what happens to the lemmings. Myriads of young lemmings descend from their mountain home on to the cultivated lands which they ravage disastrously. Many of them even swim out to perish in the open sea. The survivors are always visited by a pestilence which reduces their numbers below the former level. This action of the lemmings seems uncommonly like wholesale suicide on the part of a large element in the population to leave the ground clear for the rest. And in this negative way migration must be good for the species of the lemmings, and for that of those butterflies that have been recorded in vast numbers flying straight out into the Atlantic or the Pacific to certain death.

On the other hand one might expect to find a hunger swarm resulting from a very unfavourable year if this led to a shortage of the food supply and not directly to a diminution of the species. Cold and

wet seasons would indeed be very unlikely to encourage migratory activity. But hot dry seasons will at once excite it and make it necessary by parching up the food plant of the larvae and obliging the insects to go elsewhere to oviposit.

In this way *P. cardui*, and *A. plexippus*, to quote two among many migrants, as they make their almost annual attempt to extend their range northward, occupy no new ground and leave no permanent colonies anywhere in the northern regions. But at least they have eased the overcrowding in their original home and perhaps avoided the pestilence which overcrowding always brings. To this limited extent only can all migration be definitely called beneficial to the race. All other purposes can only be described as conjectural, and to generalize safely on the subject requires a great many more scientific and accurate observations than we have yet at our disposal. In all its main features insect migration is still an unsolved mystery.

THE BIRD'S NEST ORCHIS

By JOHN E. S. DALLAS

THE clearing, not long since, of some woods near Mickleham, which formed the most important station within the Society's district for *Neottia nidus-avis*, may be urged as the excuse for this short note.

The English name is derived from the plant's roots, which are more or less like the basket-shaped nest of a bird. It is our only saprophytic orchis, obtaining probably the whole of its nourishment from the decaying beech leaves among which it invariably grows. The whole plant, root, stem, bract-like leaves and flowers, is light brown in colour, having no chlorophyll, and is fleshy in texture.

The species is recorded from some ten or twelve stations within the Society's area, and I may mention that although at the Mickleham station the ground occupied by the plants has been greatly reduced, a good number still grow in a section of the wood which remains standing. Just beyond our area, on the chalk hills between Dorking and Guildford, and on the Kentish Downs, it is not uncommon, and it has several stations on the Chilterns. In other parts of England it is not infrequent in beechwood districts; the South Downs and the Cotswolds may be given as localities where I have met it myself.

The Bird's Nest Orchis is in flower in May and June, and I can think of few flower scenes more idyllic than dozens of this interesting plant backed by the dark screen of a neighbouring pine-wood, while over them wave the graceful boughs of the beeches, their fringed silky leaves catching the only light which pierces the green vault of early summer.



THE BIRD'S NEST ORCHIS
(*Neottia nidus-avis*)

Photographs by J. E. S. Dallas



RABBITS AND BUTTERFLIES

By R. W. ROBBINS

THE food plant of our two chalk hill "Blues," *Agriades coridon*, *Poda*, and *Agriades thetis*, Rott. (*bellargus*), as is well known, is the Horse-shoe Vetch (*Hippocrepis comosa*, L.). This small vetch is widely distributed on the chalk and limestone formations of England, although it does not seem to be plentiful everywhere within its area. At any rate, it is rare on the southern slopes of the Downs in East Surrey, the thin soil and hot dry exposure being perhaps unsuited to its needs. Consequently, on this part of the Downs, these butterflies are very restricted, and, in ten years residence at Limpsfield, I have found them only in one spot within a range of some few miles —an old chalk pit above and just to the east of the great chalk pit at Oxted, which is so conspicuous a landmark from this part of the Weald. Here on the floor of the old pit, about 700 feet above sea level, the vetch was found abundantly, and in August plenty of *A. coridon* were present to be joined later by a smaller number of the second brood of *A. thetis*.

This isolated colony of *coridon* was interesting, for perhaps 20 per cent. of the females were more or less suffused with blue above, with undersides of blackish and greyish tones, in place of the normal brown. There was also some variation in the males.

In August 1920 I noted in my diary that "*A. coridon* was very abundant" at this spot. In the second week in September fresh females were still to be found and at the same time 25 or 30 male *A. thetis* were seen. Subsequent years show a diminution in numbers, but in August, 1924, *coridon* was still "not uncommon."

In 1925 I do not appear to have visited the spot in August or September. However, on August 12th, 1926, I spent the morning on the ground. It was a sunny day with passing clouds. Not one example of *A. coridon* was seen. There was a striking absence of butterflies of any species. Puzzled by this, I examined the ground with some care. The herbage was close-bitten, the only plants standing above the turf being the Yellow Wort (*Chlora*) the Centaury (*Erythraea*) and the Autumnal Gentian, all belonging to the *Gentianaceæ* and containing a bitter principle. Rosettes of the Stemless Thistle (*Cnicus acaulis*) were abundant, but I failed to find one with bud or flower. These buds are solid, "nutty" and not spiny; they had vanished. Each rosette had a raw bitten centre. A lengthy search was made for *Hippocrepis* but it was fruitless. Neither on the floor of the pit, nor on the surrounding slopes, where a few years ago I had seen the "Blues" depositing their eggs, could the vetch now be found. The conclusion was to me irresistible. Rabbits, whose pellets were plentiful on the turf, had taken possession, and in their relish for the tender and

probably tasty little vetch, had wiped out our "Blues," eggs and larvae alike.

What is the explanation of this great and apparently sudden increase of the rabbits? They were always to be found in small numbers on these slopes. A cottager told me that, now the neighbouring woods are again preserved, shooting rabbits was forbidden. But I doubt if they were ever shot on the hills more than at present. The chain of causation is, I think, longer than that.

In the immediate neighbourhood are eight or ten cottages occupied by workers in the chalk pits; other workers come from a distance. During the War, particularly in the period of rationing, snared rabbits were a welcome addition to the family meal. After the War, wages rose to unknown heights, butchers' meat was freely procurable, building recommenced, lime was in demand, and with regular work at good pay the lime workers, except perhaps in their cottage gardens, no longer concerned themselves with the rabbits. The disappearance of the chalk hill "Blues" from the Oxted downs is, in my view, a direct result of the post-war boom in the building industry.

NOTES ON PLANT-GALLS

By H. J. BURKILL.

(1) *Hypericum elodes*, L., galled by larvae of a midge. The terminal leaves are curled and crinkled, and in the folds thus produced live a number of maize-yellow coloured larvae. Several galled plants found in one locality in Yorkshire some years ago. I have not been able to find any others or to hear of the gall from other sources.

(2) *Hieracium pilosella*, L., galled by *Eriophyes pilosellae*, Nal. A neat, tight rolling of the margin of the leaf upwards. Also from Yorkshire.

(3) *Primula veris*, L. The whole of the flowers on the stalk completely distorted, the calyx and corolla being cut up into ribbons. Densely hairy. Apparently due to Mites but none were detected on microscopical examination. Mr. L. B. Hall found three plants affected near Debden, in Essex. (Sketch enlarged to twice natural size.)

(4) *Galium aparine*, L. The tips of the plants covered with a thick coating of white hairs, unicellular, and hooked, giving the appearance of a thin layer of cotton-wool over a patch of the plants. All the plants in one place for about twenty yards were attacked, and so aborted that no seed was produced, and the plants died out. Resembles the work of Mites, but here again, nothing was detected on microscopical examination. Has been found in three different localities near Hounslow in recent years.



Hypericum clodes



Hieracium pilosella



Primula veris



Galium aparine

ARCHAEOLOGICAL INSPECTIONS

Bow Church, Cheapside.—Visited January 2nd, 1926.

OUR meeting was held in the vestry of this interesting London Church. Prebendary S. G. Ponsonby gave us an historical account whilst Mr. E. S. Underwood, surveyor to the church, read a paper and subsequently escorted us over the church and crypt. The latter, which explains the title "le Bow," has a groined ceiling supported by simple columns, all of late Saxon or Early Norman workmanship.

After the fire of London had destroyed the earlier church (but not the crypt) Christopher Wren built the present Renaissance structure upon the ancient crypt. Wren's tower, the steeple to which rivals that of St. Brides, Fleet Street, has as its foundations a Roman pavement 18 feet below the present street level. This shows that the level of London hereabouts has been raised approximately one foot in each century since the days when the city was in Roman occupation.

A short record of our visit has been placed in our Library.

St. Peter and St. Paul Lingfield, Surrey.—Visited April 10th, 1926.

A well attended meeting took place in this typical fifteenth century church, and great interest was shown in its wonderful array of brasses and monuments, all of which are described and illustrated in our record.

The church is large, with a north aisle divided from the nave by good fifteenth century arcading. The chancel is spacious with north and south chapels, all of fifteenth century date. The tower with its fifteenth century shingled spire is on the south side towards the west end. The screens and choir stalls are of interest. The font is fifteenth century, and there is a chained bible by the south entrance. The roof covering of Horsham slabs is noteworthy. Old houses of great charm surround the church.

St. Peters Iver, Bucks.—Visited October 2nd, 1926.

The plan of the nave of this church is undoubtedly Saxon, though late in the period. A blocked window opening of that period shows to-day on the north side of the nave. There is a fine Norman arcade on the north side of the nave and the base of the tower (which is at the west end) is also Norman. The south arcade of the nave is Early English, though it was altered two hundred years afterwards. The chancel is Early English with typical double piscina and sedilia. A fine window was inserted in the north wall of the chancel in the Decorated period. In the fifteenth century both the north and south aisles were widened.

We found the church interesting and well cared for.

H. SPENCER STOWELL, *Recorder.*

NOTES ON BIRDS ROUND WINCHMORE HILL THIRTY YEARS AGO AND TO-DAY

By PERCY J. HANSON

COMPARED with thirty years ago there is a great difference in the number and variety of the birds to be found round Winchmore Hill to-day. Then birds of many species were plentiful in the neighbourhood, and as the records of the Society show, it was visited by some very interesting strangers. Now the birds are limited in numbers and species, and interesting records are few and far between. The main factor in bringing about this difference has been the great change that has been made in the character of the district. Then it was open country and sufficiently rural to attract almost any kind of bird, but now most of it is enclosed and built on.

In considering the district it is best to divide it into four parts, roughly north, south, east and west, with the Green Dragon Hotel as the centre. By west I mean the portion on the west of the railway to the N.W., embracing Eversney Park, Worlds End Lane, and South Lodge Estate; by east, the district on the east of Green Lanes and the grounds of Halliwick House across to Bury Street; by south, Winchmore Hill Woods (Grovelands Park) Estate which thirty years ago reached across the Old Park to Palmers Green Station and Old Southgate, and by north, the fields, orchards and woodland across to Enfield on the west of the Green Lanes.

Standing at the centre the first thing that would have struck you thirty years ago would have been the fine old rookery in the grounds of Beaulieu House facing the Hotel. From my notes I find that in 1894 there were about 20 to 30 nests. In 1895, in which year the old family at the House died out, there were only two nests and in 1896 there were none. In 1897 the rooks returned and there were 13 nests besides an offshoot of 5 nests in some trees on the right of Middle Lane (now Station Road) near the village. In 1898 there were 17 nests, but in 1899 the number was reduced to 14. Soon after the trees were cut down and a row of shops built on the site. The rooks then shifted to some tall trees in Doctor Simpson's garden, Roseville, in Winchmore Hill Village, where there were 19 nests in 1920 and 17 in 1923.

WEST. This was a fine stretch of country and it is the part that is least altered to-day. Here one might expect to turn up anything. I find many of my best records come from this district. This is where we saw the Scarlet Grosbeak in 1897. It was on the ground under some fir and alder trees at the west end of the big lake.

Here I could always rely on finding nests of the Mallard, Coot and

Moorhen, and Flerons were invariably to be seen there. Note from Diary, May 14th, 1899, "Mallard 6 eggs, another with five young which I photographed with a Coot's nest with 8 eggs. Also one with 6 eggs and another with 1 egg."

Reed Buntings were fairly common and Snipe were often flushed. This is the only place where I have heard the Grasshopper Warbler. My record is May 6th, 1906. There was also a very large Rookery here comprising about 100 nests, but no trace of it is to be found to-day. In quite recent years Linnets nested in the furze bushes on the western edge of South Lodge. The Little Grebe nested on the top lake. I have a fine lot of photographs of it, and am glad to say it is still there this year.

Tawny Owls have favoured one tree in this neighbourhood ever since I can remember, although they were not there last year. In 1923 I saw the Little Owl for the first time over there.

Among the interesting species of the district was a breed of Common Wren that always built in small holly bushes about 12 or 18 inches from the ground. The Partridge was fairly common. I have a record of a nest with 11 eggs in 1895.

I am glad to say the Woodpeckers are still to be found round there. The Lesser Spotted nested there in 1893, the Greater Spotted in 1894. I saw the Green there in 1924.

EAST. The country on the east of Green Lanes.

Halliwick House grounds was a fine park surrounded by a belt of trees and a shrubbery with a path running through it all round. This was one of our favourite hunting grounds. We could always get nests of the Marsh, Blue, Cole and Great Tits in the old trees round the shrubbery. This was also a great place for Black Cap which regularly built in the low loose hedge on the edge. In a fine old oak with loose bark we found the Tree Creeper nesting several times. In another corner, near where the tram road now cuts through the park, there was a colony of Tree Sparrows. There were several small clumps of tall elm trees in the park, in one of which a Kestrel brought off its brood in an old crow's nest in May, 1900. We used to watch the old birds feeding the young. The Nightingale rested in the part near Green Lanes.

In the fields nearer Enfield we could generally find the Greenfinch. There were several nests close together. It is very curious how one species will keep near a particular place. The Greenfinch was not a common bird here. We used to find its nest in the fruit trees of Pike's Orchards, but the species was never plentiful. In the same way the Flycatchers had their own special corner and came back to it year after year.

I saw the Common Sandpiper on the New River bank on September 7th, 1919.

SOUTH. Winchmore Hill Woods and the fields across to Palmers Green Station.

"Grovelands Public Park" to-day. This was Major Taylor's Estate and reached from Winchmore Hill Village along the railway line to Bourne Hill and Fox Lane, on the south of which (built over

to-day) was the old park, from Palmers Green Station along Aldermans Hill to the Old Cherry Tree Inn, Southgate, nearly opposite which is "Arno's Grove" the old home of "Walkers" the famous cricketers. It was on the lawn here that the caretaker shot the Hoopoe in May, 1907, (see Society's Records.)

In those days this was a very nice compact estate with three game-keepers. I do not think they went in for game strictly speaking, but there was a large herd of deer in the Park and I daresay it had to be closely watched.

There were always plenty of duck round the lakes of which there were three. The large one which is now in Grovelands Park, and a small one near Palmers Green Station and the Old Moat both of which are drained and built over to-day (Derwent Road and Lakeside Road).

I never saw eggs of any of the Hawks here although we used to see the Sparrow Hawk sometimes, but I suppose the keepers destroyed the eggs or nests.

One of them told me that a fine Osprey visited the large lake for two years, but that was before I became friendly with him.

Jays were kept down at that time. I think there are more about to-day. I saw six or eight on one occasion in my father's garden in Broad Walk in 1923. I found one magpie's nest regularly for years, but the keeper used to take and sell the young birds, so they did not increase much. Last nest 1907. The bird I most liked watching was the Nightjar which was very plentiful there. It is quite gone to-day. There were also several pairs of Carrion Crows which the keeper did not seem to mind. We could always find a nest or two in the strip of wood on the south of Broad Walk which was an unfenced path in those days.

Long-tailed Tits always nested in the hedges of the field towards Happers Road which is for the most part built over to-day. There were large flocks of Mallard (nest 11 eggs 1903, largest number) and Pochard (very large flock March 4th, 1896), but there was not much reed to give them cover round the edge. In fact the clump of bulrushes on the south side was imported by the keeper and myself and planted there. It makes quite a nice clump to-day. The Little Grebe always used to breed on the old Moat. I never remember seeing Coot there; only on the large lake.

Nightingales were very plentiful. I have found as many as four nests in one season. Nuthatches are still fairly common. I saw four young in 1924. I have not seen Redstart for the last ten years. I remember one built on the side of the keeper's cottage in Broad Walk which was pulled down last year.

I think one of the best records comes from my own garden in Middle Lane (now Station Rd.) which falls in this portion of the district. We had a row of Mountain Ash trees all down one side, and on September 30th, 1907, I was very surprised to see three Ring Ouzles, two females and one male feeding on the berries in the early morning. They visited the trees each morning till October 4th.

The only times I have seen Wood Warblers in the district are May 20th, 1918 and 1922, in Winchmore Hill Wood. Flycatchers still nest in the neighbourhood. I have records for 1923-24-25-26.

NORTH. This district was the one in which I spent the most time, embracing as it did fields, a small wood, Salmon Brook, Pike's market gardens and orchards (which may account for some of the attraction).

In the early days you could always hear the Land Rail and I found several nests (last record July 22nd, 1897). Hawfinches were most often found in the top orchards near the railway, the bank of which was a famous place for Whinchats (not seen there for the last three years). Redbacked Shrike used to like the tall isolated bushes near the fields. Tree Pipits and Skylarks were always found there. There is a great difference now. Most of the bank is spoilt and a station (Grange Park) built just near where the old Horseshoe Arch went under the line (now filled in). It was in this corner where we always looked for the Wryneck. I have photos (1898) showing where it built in an old railway sleeper sticking out of the bank, with the old farm in the distance (last recorded 1920). There is a row of houses there to-day. In fact that piece of bank would take a lot of beating, with its clumps of sweet scented violets and swarms of butterflies in the summer. In winter it was visited by flocks of Goldfinch and Redpole. The latter was always rather an uncommon bird in the district. I found it nesting only once, October 30th, 1898, in a fruit tree near the bank.

The brook which runs through was always interesting especially when it flooded out over the fields. Then we had large flocks of Lapwing (November 7th, 1897 and February 12th, 1899) and Black-headed Gulls with a few Snipe sometimes (November 29th, 1897). The Kingfisher was generally to be seen, although we only found it nesting once, and plenty of Moorhens. Lesser Spotted Woodpeckers used to nest in the old willow trees on its banks, and just where they have altered the course of it, there was a colony of Tree Sparrows. Yellowhammer, never very plentiful, used to nest in this corner.

In the fruit orchards themselves the Garden Warbler was very plentiful, nesting in the gooseberry bushes, while the Greater Spotted Woodpeckers built quite low down in the fruit trees (May 1st, 1893) with Hawfinches in the taller pear trees (5 eggs May 15th, 1898) and large flocks of Tits and Goldcrest used to come in the late autumn and winter. Blackbirds and Thrushes were very fond of nesting under the rhubarb leaves on the ground.

The wood was a fine place. Barn and Tawny Owls could be heard there. The former used to breed in the old sheds and trees opposite the Green Dragon, together with a few pairs of Jackdaws. The last Barn Owl I saw nesting was under the eaves of a house in Cecil Road, Enfield, 1909. The old birds used to sit outside and caused much interest in the road.

Magpies were fairly common. I remember finding one nest with 8 eggs which could be seen from the public path. Nightingales were also

there. I found one nest in Green Dragon Lane not 100 yards from my friend's house.

Another bird that I have not seen of recent years in the district is the Red-legged Partridge. We got one nest before 1895. It would do one good even to see a covey of the Common Partridge there to-day.

Also large flocks of Finches with a few Bramblings (5/2/94) among them. I remember watching a pair of Brambling in late April, 1901, hoping they would breed, but I had no luck.

One bird puzzled us in those days. It used to visit some small ponds. We saw it fly away several times showing a white rump. I have no doubt now that it was a Green Sandpiper.

Two of the most interesting records are the Leech's Forked-tailed Petrel picked up wounded by shot at Wades Hill, now in Mr. Paulin's collection, December, 1907, and a Puffin seen by O. G. Pike and myself flying over the fields low down on January 17th, 1894.

And one bird I must not forget, Sand Martin, which used to breed in a small gravel pit in what is to-day the Bush Hill golf course, but that was before I started keeping notes, about 1892.

PUBLICATIONS BY MEMBERS

During the past year we have had the pleasure of welcoming the following books written by Members of the Society.

(1) *SEA-GIRT JUNGLES*, by C. L. Collenette, F.E.S., illustrated by photos taken by the Author or by Miss Longfield, another of our Members who was associated with him on the staff of the St. George expedition to the Pacific. Mr. Collenette describes in a fascinating manner some of the experiences and incidents that fell to his lot while studying the fauna of the different islands visited by the expedition. Chapter III. dealing with the remarkable forms of life found on the Galapagos Islands can be read and re-read with interest. Every Member of the Society who has not already become the possessor of a copy should put his name down on the Library list without delay.

(2) *EXPLORING ENGLAND*, by C. S. Bayne. Illustrated. A book dealing very fully with out-door life in a series of chapters entitled, "Fields," "The Hedgerows," "The Woods," etc., each of them crammed with information on different species of the animal or plant world. As we close the book we are filled with a feeling of admiration for the author's powers of observation for details which can so often be overlooked by most of us, but which, thanks to Mr. Bayne, are now brought to our notice in a delightful manner.

(3) *HOW TO LOOK AT OLD CHURCHES*, by H. S. Stowell, L.B.I.B.A., has now reached its second edition, thus proving its usefulness.

Mr. W. E. Glegg has contributed some valuable articles on the Birds of the Essex Rivers to the Essex Naturalist. H.J.B.

REPORTS FOR THE YEAR THE COUNCIL

ON the score of economy, the custom of previous years will be followed, and no balance sheet be printed. The General Secretary will, however, be happy to forward a copy of the sheet to any member on application. The income for general purposes amounted to £59 5s. 7d., an increase of £8 19s. 7d.; the expenditure to £50 9s. 2½d., an increase of £8 19s. 9½d.: the credit balance for the year was £8 16s. 4½d., which added to £25 19s. 5d., brought in from the previous year, leaves the general account with a credit balance of £34 15s. 9½d. The Life Composition Account has risen by £15, from £25 to £40. The debit balance on the "London Naturalist" account is £17 1s. 0½d. against £17 18s. 5½d., a reduction of 17s. 5d. The total credit balance has risen from £33s. 0s. 11½d. to £57 14s. 9d., an increase of £24 13s. 9½d.

The membership is rising; leaving out of account for the moment the erasure under Rule 31 of names of members long in arrears with their subscriptions (an operation which took place during the year after an interval of three years), the losses numbered five, whilst the number of new members was twenty-seven. The net increase of paying members was twenty-two, an encouraging figure; and this accounts for the bulk of the increase in general income stated above. Erasures under the rule quoted resulted in the striking off of ten names. The recension of the list will take place annually in future and there should then be a general correspondence in any year between the ebb or flow of membership and that of income. Five new Branch Associates were admitted, against three losses, whilst erasures numbered four. There was no new Country or School Associate, and under this head occurred one loss and two erasures.

The attendances at Winchester House expanded, the average rising from 38·8 to 44. The average attendance of members was 30·4, and of visitors 13·6. The programme of meetings was up to the high standard now fortunately usual. The Council were particularly glad to welcome as a lecturer on two occasions Mr. A. S. Le Souef, C.M.Z.S., R.A.O.U., of the Taronga Zoological Park, Sydney, Australia. A striking feature of many of the lectures was the artistic beauty of the slides with which they were illustrated.

The Sections carried out a full programme of field meetings, these numbering 39 against 40 in the previous year. The General Strike was responsible for the abandonment of several out-door meetings. Mrs. W. Boyd Watt again acted as delegate to the Annual Congress of the South-Eastern Union of Scientific Societies: whilst the President visited Bishops Stortford College to judge the exhibits at the annual

natural history competition. The Chingford Branch held a series of successful meetings under the guidance of its Chairman, the Rev. H. J. Gamble, and Secretary, Mr. E. Samuelson.

The thanks of the Council are due to the Librarians and Curators for their work in reorganising and popularizing the Society's library and collections. A notable addition to the latter was the gift by Mr. F. Cross of his collection of British lepidoptera.

The year was one of progress on well-tested lines, and the Council highly appreciate the enthusiasm shown by members. It was decided to make at the beginning of 1927 a special request to members to enlist new members. With the existing very low subscription, a large membership is essential, if the numerous activities of the Society are to be enlarged, the "London Naturalist" to grow to its proper size, and the Society to assume a fitting place among the field clubs of the country.

J. P. HARDIMAN,
General Secretary.

BOTANICAL SECTION

SEVEN expeditions were carried out during the year, the last being a fungus foray at Oxshott led by Mr. J. Ramsbottom, the distinguished mycologist from the Natural History Museum.

At the sectional meeting on November 16th, Mr. John Fraser, F.L.S., one of the first authorities in the country on the subject, read a most able and interesting paper on "British Willows."

A scheme has been inaugurated during the year for revising and bringing up to date De Crespigny's little book, "A New London Flora" which was published in 1877, and members have been assisting the Chairman in the work, but more helpers are wanted before the local lists are ready for publication. The area of the book covers a radius of about 30 miles round London, and embraces places as far distant as Godalming and Southend.

It is hoped to form a collection of plant photographs on the lines of the valuable collection of bird portraits formed by the Ornithological Section.

Additions to the botanical records for the Society's district are now, in the main, enlargements of the distribution of plants already known, for certain areas are still imperfectly examined. Of the 15 new species recorded several are aliens or casuals, but the following call for notice.

In the Northern Section:—*Rosa tomentosa*, Sm., var. *eglandulosa*, W-Dod., *Drosera longifolia*, L., both discovered in Epping Forest by B. T. Ward. The latter plant is apparently new to Essex.

In the Southern Section:—*Helleborus foetidus*, L., was added to our records, being found in some quantity in its old Surrey Station. *Lilium*

Martagon, L., was seen in bloom, but it is reduced considerably in quantity. Several stations for the local *Cynoglossum montanum* were discovered. The beautiful *Lathyrus tuberosus*, L., is well established in a locality in East Surrey, in bushy ground. The sweet pea scent of this flower is very noticeable when freshly gathered, but it is not retained for more than a day or so. The following species were also added to the record on the authority of the Botanical Exchange Club reports:—*Rubus pubescens*, Whe., var. *subinermis*, Rogers, *Myriophyllum spicatum*, L., *Centaurea Jacea*, L.

Outside our radius a record of special interest is the discovery by Messrs. E. M. and L. G. Payne of the ferns *Lastrea aemula*, Brackenridge, and *Hymenophyllum tunbridgense*, Sm., in a locality in Mid-Sussex. On the excursion to Fyfield in July *Lathyrus tuberosus*, L., and *Trifolium ochroleucon*, Huds., were found in quantity, and the visit to Chobham Common in September was equally successful, the special objective *Gentiana Pneumonanthe*, L., being seen over a wide area. *Spiranthes autumnalis*, Rich., also occurred freely in the neighbourhood.

Two of our members had the pleasure of seeing *Stachys alpina*, L., in its sole British station in the Western Cotswolds.

HERMAN SPOONER, *Chairman.*

LAWRENCE J. TREMAYNE, *Secretary.*

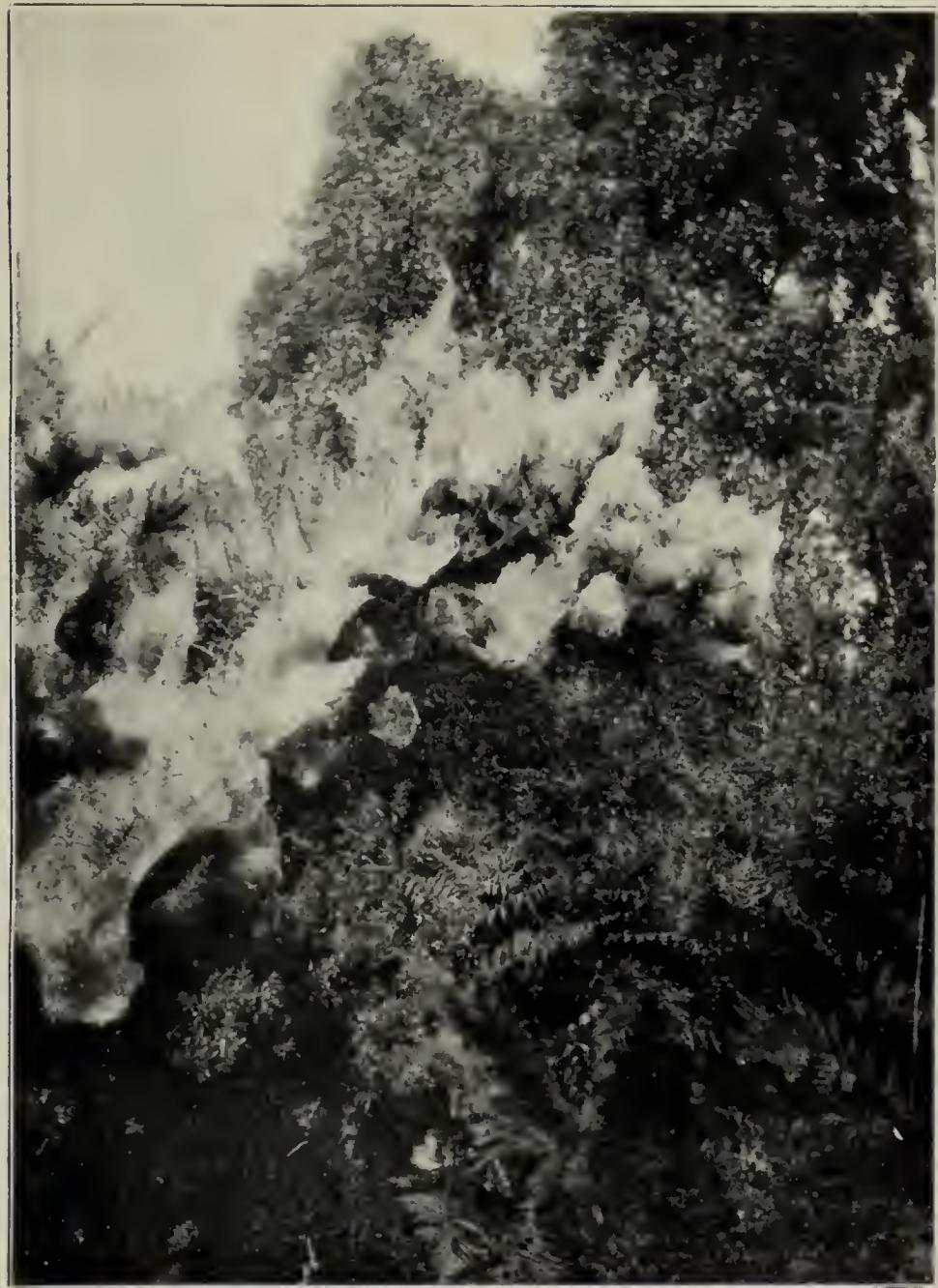
ENTOMOLOGICAL SECTION

SECTIONAL papers read dealt with "Sawflies" by Mr. J. C. Robbins on June 1st, and "The Genus *Tilia* and its Insects" by Messrs. J. C. Robbins and R. W. Robbins.

The weather was frequently unfavourable for outdoor work, and few captures of interest seem to have been made. Mention should, however, be made of a beautiful example of *Euchloe cardamines* tipped with pale lemon yellow instead of orange, which was taken by Mr. R. W. Robbins on June 13th, in Northamptonshire.

Gonepteryx rhamni was a conspicuous insect in the spring and again during the latter part of the season. *Pyrameis cardui* was recorded in some numbers in various localities, and Mr. Tremayne reported one seen in St. James's Park. He also met with *Limenitis sibylla* near Puttenham, and *Satyrus seynei* in Windsor Park. *Noctua glareosa* was taken by Mr. R. W. Robbins near Sunningdale at the Botanical excursion on Sept. 4th. Mr. Aris recorded seeing all four species of *Vanessa* together in Cornwall, and a male *Amorpha populi* taken on Sept. 5th.

Mr. J. C. Robbins has continued his work on Sawflies. He has also been successful in breeding some interesting parasites, including a Chalcid, *Eurytoma curta*, Wlk., from *Urophora solstitialis*, L., and a Tachinid, *Diplostichus janitrix*, Htg., from the Sawfly, *Diprion pini*, L., from Esher (See "Proc. Ent. Soc. London," Vol. II., 1927). Adults of



SWARM OF MITES (*Tetranychus lintearius*, Duf.)
On a bush of Gorse (*Ulex europeus*) near Fittleworth
Photograph by Mrs. Wilde



E. curta and its host, *Urophora solstitialis* emerged between July 12th and August 14th, from galled heads of *Centaurea nigra*, L., collected at Limpsfield, February 14th. ~~A single *D. janitrix* emerged, probably about August 10th, from the cocoons spun by a larva of *D. pini* collected on a garden rose at Limpsfield, August 31st, 1925. Imagines of *D. pini* from larvae collected at the same time, emerged from May 28th to June 16th.~~

The mite *Tetranychus lintearius*, Duf., was found swarming in enormous numbers on a bush of *Ulex europaeus* near Fittleworth. The bush measured 15 feet by 12 in diameter and was 6 feet high, the whole being densely covered by layers of white webbing enshrouding the clusters of mites.

H. J. BURKILL, *Secretary.*

PLANT-GALLS SECTION

THE Section visited Headley, June 26th; Epping Forest, July 4th; Effingham and Ockham Commons, September 25th; and Limpsfield, October 9th, when some interesting notes on various species were made. An unofficial visit was also made by some of the members to Fittleworth, Sussex, in September when attention was especially directed to the Roses, as *Rhodites* galls have been plentiful.

The following records of galls on their respective host-plants are selected from the mass of material collected during the year.

Cardamine pratensis, L.—*Centhorrhynchus pectoralis*, Schult. Headley, H. J. Burkill.

Lychnis diurna, Sibth.—*Contarinia steini*, Karsch. Sussex, H.J.B.

Geranium molle, L.—*Eriophyes* sp. Possibly *E. Schlectendali* Nal., as the plants were growing among the next species. Sussex, H.J.B.

Erodium cicutarium, L'Herit.—*E. Schlectendali*, Nal. Sussex, H.J.B.

Rhamnus catharticus, L.—(1) *Eriophyes annulatus*, Nal. New Forest, L. B. Hall.—(2) Margins of leaves rolled tightly upwards, apparently due to mites. New Forest, L.B.H.

Acer Pseudo-platanus, L.—(1) *Eriophyes* sp. (Houard, ? 3980.) This gall appeared again in Chiswick where it was observed in 1925. Another tree some three hundred yards away which was attacked in 1925 showed none of the galls this year, but several of its leaves were as usual attacked by *E. macrorhynchus*, Nal. On Putney Heath the tree attacked last year has been severely pruned and no large galls were detected, only those of *E. macrorhynchus*. Near Leatherhead it was not seen. H.J.B.—(2) *Eriophyes* sp. Leaves very much curled, and the under surface densely covered with short hairs. Fulmer, H.J.B. —(3) ? *Eriophyes* sp. The old flowers and young seeds densely covered with short hairs, which suggest the presence of mites but none were detected on microscopical examination.

Ulex Galii, Planch.—*Apion scutellare*, Kirby. Dorset, L.B.H.

Medicago lupulina, L.—*Perrisia trifolii*, F. Low. Sussex, H.J.B.

Trifolium pratense, L., var. *parviflorum*, Bab. Constriction of the calyx preventing the corolla from expanding. Due to Aphides. Fetcham, Surrey, H.J.B.

Amygdalus persica, L.—*Anuraphis persicae*, Buckt. Cobham, Surrey, H.J.B.

Rubus idaeus, L.—*Perrisia plicatric*, H. Low. Sussex, H.J.B.

Rubus rusticanus, Merc.—*Diastrophus rubi*, Hartig. Leatherhead, H.J.B.

Rosa arvensis, Huds.—*Rhodites eglanteriae*, Hartig. Effingham, H.J.B. (2) *Perrisia rosarum*, Hardy. Sussex, E. B. Bishop. *R. stylosa*, Desv., var. *systyla*, Baker.—(1) *Rhodites rosarum*, Giraud. Sussex, E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, E.B.B. (3) *P. rosarum*, Hardy. Sussex, E.B.B. *R. spinosissima*, L.—*Rh. spinosissimae*, Giraud. Very abundant in a London locality, H.J.B. Also on the South Downs near Chanctonbury, E.B.B. *R. spinosissima*, var. *pimpinellifolia*, L.—*Rh. spinosissimae*, Giraud. South Downs near Chanctonbury, E.B.B. *R. canina*, L.—(1) *Rh. rosae*, L. Sussex, H.J.B. and E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, H.J.B. and E.B.B. Surrey, H.J.B. (3) *Rh. rosarum*, Giraud. Sussex, E.B.B. *R. dumetorum*, Thuill.—*Rh. rosae*, L. Sussex, E.B.B. *R. dumetorum*, Thuill., var. *jactata*, Desegl.—*Rh. rosarum*, Giraud. Sussex, E.B.B. *R. micrantha*, Sm.—(1) *Rh. rosae*, L. Sussex, E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, E.B.B.

Viburnum Lantana, L.—(1) *Oligotrophus Solmsii*, Kieff. In various places along the North Downs, H.J.B. (2) *Contarinia lonicearum*, F. Low. Box Hill, and Polesden Lacy, H.J.B. (3) *C. viburni*, Kieff. With the last species, H.J.B. (4) *Eriophyes viburni*, Nal. Fetcham

Asperula cynanchica, L.—*Phyllocoptes minutus*, Nal. Fetcham Downs, H.J.B.

Gnaphalium uliginosum, L.—*Pemphigus filaginis*, Fonsc. Sussex, H.J.B.

Achillea Millefolium L.—*Oxyna flavipennis*, H. Low. Fetcham. H.J.B.

A. Ptarmica, L.—*Eriophyes* sp. This gall, first noted last year, was again plentiful in the same locality near Wimbledon, H.J.B.

Hieracium boreale Fr.—*Carpotricha pupillata*, Fallen. Sussex, E.B.B.

H. tridentatum, Fr.—*C. pupillata*, Fallen. Sussex, E.B.B.

Fraxinus excelsior, L.—*Eriophyes* sp. Patches of brown hairs on the under surface of the leaf. Sussex, H.J.B.

Solanum Dulcamara, L.—*Aphis* sp. Leaves crumpled and curled. L. J. Tremayne.

Ulmus montana, Stokes.—(1) *Eriophyes* sp. Patches of white hairs on the under surface of the leaf. Leatherhead, J. Ross and B. T. Ward. (2) *Eriophyes* sp. Veins of the leaves twisted and curved. Leatherhead, H.J.B. (Houard, 6551). (3) *Eriophyes ulmi*, Nal. Tufts of white hairs in the axils of the veins. Fetcham, H.J.B.

Betula alba, L.—*Eriophyes* sp. The "big bud" bluntly keeled,

recorded from Epping Forest last year was found in May on Wimbledon Common. Microscopic examination disclosed mites and eggs. These specimens were compared at the time with *Eriophyes rudis*, Can., and they are apparently not identical, H.J.B.

Carpinus betulus, L.—*Eriophyes tenellus*, Schl. Bucks, H.J.B.

Quercus intermedia, Don.—*Neuroterus laeviusculus*, Schenck. Fittleworth, E.B.B. *Q. ilex*, L.—*Eriophyes ilicis*, Can. Arundel, H.J.B. *Q. cerris*, L.—(1) *Andricus curvator*, Hartig. Claygate, H.J.B. (2) *A. circulans*, Mayr. Ham Common, H.J.B. (3) *A. testaceipes*, Hartig. Sussex. H.J.B. (4) *Callirhytis glandium*, Giraud. This gall was found in considerable quantity at Martyr's Green, and near Limpsfield, H.J.B.

Fagus sylvatica, L.—*Eriophyes nervisequus*, Can. var. *maculifer*, Trotter. Very fine specimens were found near Leatherhead, J. Ross.

Salix pentandra, L.—*Eriophyes triradiatus*, Nal. Seven trees in the clump on Wimbledon Common are now attacked by this mite, H.J.B. *S. alba*, L. × *triandra*, L. (*undulata*, Ehrh.)—*E. triradiatus*, Nal. Kew, J. Fraser. *S. cinerea*, L.—*Agromyza Schineri*, Giraud. Several fine series of galls at Effingham, J. Ross, and at Limpsfield, J. C. Robbins.

Populus tremula, L.—*A. Schineri*, Giraud. Wimbledon Common, H.J.B. This gall was apparently recorded by Connold for Britain but without a name.

Phragmites communis, Trin.—*Lipara lucens*, Meigen. Very abundant at the Black Pond, Esher this year, H.J.B.

Sequoia sempervirens, Endl.—*Eriophyes* sp. (possibly *psilaspis*, Nal.) enlarging the buds. Dorset, L.B.H.

Taxus baccata, L.—*Eriophyes psilaspis*, Nal. Leaves and shoots distorted as well as the buds. Surrey, H.J.B.

H. J. BURKILL, *Secretary*.

ARCHAEOLOGICAL SECTION

A PLEASING feature of this year's activities was the marked increase of attendances, both at the sectional meetings and excursions; the former being largely due to the action of the committee in their attempt to make such meetings more attractive by the introduction of a "special item." These items: Mr. Chapman's paper on the Legend of St. Edmund, and Mr. Roberts, on St. Albans, were both very interesting; and the meetings were attended by 23 and 27 members and friends respectively. The excursions to Bow, Lingfield and Iver Churches were very successful and were attended by 20, 19 and 17 members and friends respectively.

The thanks of the Section are due to Mr. Stowell for kindly undertaking the duties of secretary for six months of this year, while the Secretary was away.

W. C. FORSTER, *Secretary*.

ORNITHOLOGICAL SECTION

MR. C. S. BAYNE was elected to represent the section on the Publicity Committee of the Royal Society for the Protection of Birds. The Section has to congratulate Mr. J. P. Hardiman, C.B.E., on his election to the Council and the Watchers' Committee of that Society.

SECTIONAL MEETINGS

Two Sectional meetings were held at which the following papers were read:—January 19th, “The Identification of Bird Remains,” by Mr. P. W. Horn; November 16th, “Some Birds from Algeria,” by Miss G. Lister, F.L.S.

On December 11th, members visited the Ornithological Department of the British Museum of Natural History when Mr. N. B. Kinnear, C.M.Z.S., M.B.O.U., kindly gave a demonstration on Extinct Birds.

The monthly field-meetings continue to be a success. Visits were made during the year to the following districts in the order named:—Tring, Thames Marshes, Ruislip, Essex Marshes, Chilterns, Broxbourne, Leatherhead, Chalfont Country, Tring, Kentish Marshes, Cheshunt Common, and Harefield.

The Committee are anxious to increase the success of the monthly field-meetings by discovering suitable new ground, frequented by ducks, waders and other water-birds, and will welcome suggestions.

Five Saturday afternoon walks were organized, the localities visited being Epping Forest (three visits), Barnes Reservoirs, and Richmond Park. A Sunday morning visit was also made to Wanstead Park.

RINGING AND COLLECTIONS

Schedules relating to 399 birds of 38 different species were sent in under the “British Birds” marking scheme, considerable assistance in this connection having been given by our correspondents, Miss F. Collins and Mr. R. W. Hale.

Two birds have been reported as recovered, both having been marked by Miss F. Collins, as follows:—(1) A starling ringed near Worthing, Sussex, as a nestling, on May 12th, 1924, was reported near where ringed on February 3rd, 1926; (2) A linnet ringed near Worthing, Sussex, as a nestling, on June 5th, 1925, was reported at Villeneuve de Marsan (Landes), France, in December, 1925.

The photographic collection now stands at 158 sheets.

The Section have to acknowledge the receipt of the skins of a Bittern and of a Kite, both with data, kindly presented by the Royal Society for the Protection of Birds.

The thanks of the Section are due to a number of correspondents who have kindly furnished notes and records.

JOHN E. S. DALLAS, *Chairman.*
SYDNEY G. POOCK, *Hon. Sec.*

NEW SPECIES

Three species new to the Society's district have been recorded, making the total number 182. These were:—*Phalacrocorax aristotelis* (Linnæus), SHAG, January 12th, seen sitting all day on the boom moored inside the lock gates of the Wapping basin, London Docks (T. M. Blagg, per S. Austin). *Sterna macrura*, Naumann, ARCTIC TERN, September 6th and 13th, two on Barnes Reservoir (L. Parmenter); September 14th, same place, one in summer plumage, (J. P. Hardiman). *Sterna s. sandicensis*, Latham, SANDWICH TERN, August 28th, two on Barnes Reservoir (A. Holte-Macpherson).

The following record in "British Birds," Vol. XX. p. 226, has been accepted by the Editor of that journal as a "probable." It is mentioned here, but the species has not been added to the Society's list:—*Surnia ulula* (subsp.), HAWK OWL, December 27th, observed at West Molesey Reservoir by W. Kay Robinson and R. W. Heenan.

INTERESTING RECORDS

Other interesting records are as follows:—

MAGPIE, *Pica p. pica* (Linnæus), January 10th, three on Fetcham Downs (J. E. S. Dallas); April 29th, Edgwarebury (L.P.); and May 17th, St. James's Park (L. J. Tremayne).

BRAMBLING, *Fringilla montifringilla*, Linnæus, July 28th, 30th, and July 9th, Hampstead Heath (R. W. Pethen), ("British Birds," Vol. XX., p. 149). YELLOWHAMMER, *Emberiza c. citrinella*, Linnæus, April 11th, Walthamstow Reservoirs (R.W.P.).

WOOD-LARK, *Lullula a. arborea* (Linnæus), April 17th, Box Hill (J.P.H.); April 18th, Box Hill, Headley, steady view on ground (J.P.H. and R. W. Robbins); June 20th, Headley Lane (pair), (J.E.S.D.); July 4th and 18th, Box Hill (new part) (J.E.S.D.).

YELLOW WAGTAIL, *Motacilla flava rayi* (Bonaparte), Barnes Reservoir, August 5th (A.H.M.); August 28th (J.P.H.); at least 100.

SEDGE-WARBLER, *Acrocephalus schænobiænus* (Linnæus), May 7th, heard singing in sanctuary by the Long Water, Kensington Gardens (C. Oldham). WOOD-WARBLER, *Phylloscopus s. sibilatrix* (Bechstein), May 5th, heard singing near Round Pond, Kensington Gardens (C.O.).

MARTIN, *Delichon u. urbica* (Linnæus), November 28th (late date), Staines town (A.H.M.).

SWIFT, *Micropus a. apus* (Linnæus), April 23rd (early date), Lonsdale Road Reservoir (A.H.M.).

BRITISH TAWNY OWL, *Strix aluco sylratica*, Shaw, November 14th, Walthamstow Reservoirs (R.W.P.).

BUZZARD, *Buteo b. buteo* (Linnæus), June 20th, 1925, seen sailing over Hayes Common, going N.E. (C. W. Colthrup) ("British Birds," Vol. XX., p. 55); seen early in October flying at moderate height over Hyde Park in N.W. direction (Hon. G. Charteris) ("British Birds," Vol. XX., p. 228).

CORMORANT, *Phalacrocorax c. carbo* (Linnæus), December 27th, 1925, Highgate Ponds (Mrs. W. Boyd Watt); Barnes Reservoir, August 5th, 21st, 25th, and 29th (J.P.H., L.P., and A.H.M.).

COMMON SHELD-DUCK, *Tadorna tadorna* (Linnæus), September 13th, Barnes Reservoir (8) (L.P.). GADWALL, *Anas strepera*, Linnæus, March 21st and September 26th, Kensington Gardens, (L.P.). WIGEON, *Mareca penelope* (Linnæus), Molesey Reservoirs, February 7th and 20th, Barnes Reservoir, March 3rd (J.P.H.); Barnes Reservoir, October 3rd and December 11th, Staines Reservoir, October 31st and November 28th (A.H.M.). SHOVELER, *Spatula clypeata* (Linnæus), Staines Reservoir, February 28th, Barnes Reservoir, March 28th and October 17th (A.H.M.). PINTAIL, *Dafila a. acuta* (Linnæus), March 7th, Staines Reservoir (A.H.M.). POCHARD, *Nyroca f. ferina* (Linnæus), February 11th, Brent Reservoir, flock of 150 (J.P.H.); October 30th, Walthamstow Reservoir, flock of at least 168 (R.W.P.). SCAUP, *Nyroca m. marila* (Linnæus), February 21st and 25th, Molesey Reservoir, 7 (4 old males) (A.H.M., and J.P.H.). GOLDEN-EYE, *Glancionetta c. clangula* (Linnæus), Barnes Reservoir, January 4th, (J.P.H.), December 4th and 11th (A.H.M.); Molesey Reservoir, February 7th and 20th (J.P.H., and A.H.M.), November 10th (L.P.); Staines Reservoir, March 13th (J.P.H.), October 31st and November 28th (A.H.M.). COMMON SCOTER, *Melanitta n. nigra* (Linnæus), November 21st, Staines Reservoir (A.H.M.). GOOSANDER, *Mergus m. merganser*, Linnæus, Barnes Reservoir, January 4th, 10th, 19th, and December 4th (J.H.P. and A.H.M.); Molesey Reservoir, January 16th, February 7th, 15th, 20th, 21st, and 25th (greatest number 40) (J.P.H., A.H.M., and L.P.); Staines Reservoir, March 13th, 27th, and December 27th (J.P.H. and A.H.M.); Penn Ponds, Richmond Park, January 7th (Miss H. Watkins). SMEW, *Mergellus albellus* (Linnæus), Barnes Reservoir, January 4th, 10th, and 19th, February 4th, March 3rd and 28th (none left), November 14th (unusually early arrival), December 4th, 8th, 11th, and 26th (J.P.H., A.H.M., and L.P.); Molesey Reservoir, January 16th, February 7th, 15th, 20th, 21st, and 25th (J.P.H., A.H.M., and L.P.); Penn Ponds, January 11th and 12th (Miss H.W.); Walthamstow Reservoirs, January 3rd and 16th, February 18th (R.W.P.).

DUNLIN, *Calidris a. alpina* (Linnæus), Staines Reservoir, January 16th; Barnes Reservoir, August 3rd (A.H.M.). GREENSHANK, *Tringa nebularia* (Gunnerus), September 5th, Brent Reservoir (3) (L.P.). COMMON SANDPIPER, *Tringa hypoleuca*, Linnæus, seen from May 1st until October 2nd, at the Brent, Staines, Hampton and Barnes Reservoirs (L.P., J.P.H. and A.H.M.). One seen on Long Water, Kensington Gardens, August 20th (L.P.). Heard calling at dusk overhead at Clapton, September 8th (R.W.P.). GREEN SANDPIPER, *Tringa ochropus*, Linnæus, September 27th, Barnes Reservoir (L.P.). CURLEW, *Numenius a. arquata* (Linnæus), January 16th (1), August 28th (small party), Staines Reservoir (A.H.M.). RINGED PLOVER, *Charadrius h. hiaticula*, Linnæus, October 10th, Brent Reservoir (5) (L.P.).

GREATER BLACK-BACKED GULL, *Larus marinus*, Linnæus, September 16th, 17th, October 17th and November 9th, Barnes Reservoir (J.P.H., A.H.M. and L.P.). BRITISH LESSER BLACK-BACKED GULL, *Larus fuscus affinis*, Reinhardt, Barnes Reservoir, August 3rd-Novem-

ber 6th (greatest number 9) (J.P.H., A.H.M. and L.P.); Staines Reservoir, August 21st (J.P.H. and A.H.M.). BLACK-HEADED GULL, *Larus r. ridibundus*, Linnaeus, July 3rd, Barnes Reservoir, 3 juveniles, only a few weeks old (A.H.M.). (Reported in "Field," November 28th). COMMON TERN, *Sterna h. hirundo*, Linnaeus, December 16th, 1925, two on Tooting Bec Common, December 17th, 1925, twelve over West Norwood (E. C. Stuart-Baker) ("British Birds," Vol. XIX., p. 256); August 7th (1) and 29th (8), Barnes Reservoir (A.H.M.). LITTLE TERN, *Sterna a. albifrons*, Pallas, August 6th, Barnes Reservoir, 1 adult (J.P.H.). BLACK TERN, *Chlidonias n. niger* (Linnaeus), August 21st, Staines Reservoir, 2 immature (J.P.H. and A.H.M.).

PUFFIN, *Fratercula arctica grabae* (C.L.Brehm.). A storm-blown bird captured on the roof of a house on Rosslyn Hill, Hampstead, November 16th, and deposited in the Zoological Gardens (D. Seth-Smith, per H. and W. Boyd Watt).

RED-NECKED GREBE, *Podiceps g. greseigena* (Boddaert), January 24th, Staines Reservoir (A.H.M.). SLAVONIAN GREBE, *Podiceps auritus* (Linnaeus), December 27th, Staines Reservoir (J.P.H. and A.H.M.). BLACK-NECKED GREBE, *Podiceps n. nigricollis*, C. L. Brehm., September 8th and 9th, Regent's Park (R. W. Hale per S. G. Pooch); Barnes Reservoir, September 14th-27th (J.P.H.), September 27th (L.P.); Staines Reservoir, October 16th and November 7th, (A.H.M.).

EPPING FOREST

Some interesting records are as follows:—

BRAMBLING, *Fringilla montifringilla*, Linnaeus, November 28th (several), December 26th (1), Hill Wood (S. Austin). SWALLOW, *Hirundo r. rustica*, Linnaeus, June 26th, one nest at High Beech (J.E.S.D.). MARTIN, *Delichon u. urbica* (Linnaeus), June 26th, ten nests at High Beach (J.E.S.D.). LITTLE OWL, *Carine noctua mira* (Witherby), June 11th, near Forest Hotel (H. Playne, per S.A.). BUZZARD, *Buteo b. buteo* (Linnaeus), February 22nd and 24th, Gillwell Lane (Miss A. Hibbert-Ware); February 28th, same place (Miss A.H.-W. and Mr. and Mrs. Boyd Watt) ("British Birds," Vol. XIX., p. 287). SPARROW-HAWK, *Accipiter n. nisus* (Linnaeus). The pair mentioned in last year's report by Mr. S. Boardman, again nested in the Forest. HERON, *Ardea c. cinerea*, Linnaeus. The Forest Superintendent wrote on September 16th that the keeper reported in May 53 nests in the Wanstead Park Heronry, being 6 more than in March. (The average for the past 9 years is 60). CORN-CRAKE, *Crex crex* (Linnaeus). Heard at Buckhurst Hill, at Whitsun (A. B. Hornblower).

A. BROWN, Recorder.

Sparrowhawk.—Since making my notes concerning season 1925, I have continued paying visits to the Sparrowhawks' haunt.

The nest in 1926 was a reconstruction of the 1924 nest in a silver birch. I saw two young, but there may have been more.

Of the 16 species of birds whose feathers were found in the haunt in 1925, 12 of these species have again been represented amongst the Sparrowhawk's victims for 1926, together with the addition of two further species, namely Blue Tit and Cuckoo.—STUART BOARDMAN.

RAMBLER'S SECTION.

THE rambles have been carried out during the year, and all have been thoroughly enjoyed. The attendance has varied between six and sixteen, the average being a little over ten.

In addition the Section also provided a paper for the general meeting of the Society on October 19th, by Mr. A. L. Simpson, well known under the pseudonym of "Pathfinder" to readers of "Evening News" and other journals. This paper which was on "London Commons and Forests" was an extremely able one and attracted a large attendance.

The arrangements made for the Section are running smoothly and well, and few improvements have been necessary during the year. The powers of the leader on each ramble have been somewhat extended, and probably it will be necessary further to extend these, so as to allow each leader to fix his own date, but the peculiar principle upon which this Section was designed has so far thoroughly justified itself in every way, and it is believed that the Section is already firmly established as a permanent and useful addition to the Society's activities.

A. B. HORNBLOWER, *Chairman.*
LAURENCE TREMAYNE, *Secretary.*

CHINGFORD BRANCH

THE number of local associates has been well maintained and the attendances have been normal, the highest being 34 and the lowest 10. Unfortunately the weather on the greater number of our meetings was very unfavourable. The following lectures were delivered: "Luminosity in Nature," by R. W. Pethen; "In Unknown Switzerland," by J. E. S. Dallas; "Insectivorous Plants," by R. W. Robbins; "Mountains," by E. Samuelson; "Palms and Angels," by Miss G. Lister, F.L.S.; "The Lea Valley," by Mrs. A. R. Hatley, B.Sc., F.R.G.S. In addition to the above, two evenings were devoted to lantern lectureettes, *viz.*, "Norway," by Miss Hibbert Ware, F.L.S.; "Mosses and Liverworts," by J. Ross; "Egypt," by Rev. H. J. Gamble, M.A.; and "Sand Dunes," by Mrs. B. Kay, M.Sc. The May lecture on "Darwin," by Lawrence J. Tremayne, had to be abandoned owing to the strike. There was also an excursion to Kew Gardens.

E. SAMUELSON, *Hon. Secretary.*

PAPERS READ TO THE SOCIETY

January 5th.—“Palms and Angels,” Miss G. Lister, F.L.S.

February 2nd.—Annual Exhibition.

“Birds,” Miss M. G. S. Best, F.Z.S., M.B.O.U.

“Mosses,” A. W. Dennis.

“Parenzo,” W. C. Forster.

February 16th.—“Birds seen in the Camargue,” W. E. Glegg, F.Z.S., M.B.O.U.

March 2nd.—“Some Notes on the St. George Expedition to the Pacific,” C. L. Collenette, F.E.S.

March 16th.—“Old Buildings and the Country Side,” A. R. Powys.

April 13th.—“Horns,” A. Capleton.

April 20th.—Bacot Memorial Meeting. “Insect Vision in relation to Flower Fertilisation,” I. H. Burkill, M.A., F.L.S.

June 15th.—“Some Wonders of Australian Natural History,” A. S. LeSouef, C.M.Z.S., R.A.O.U.

September 7th.—“Recent Work on Insectivorous Plants,” R. W. Robbins.

October 5th.—“The Wild Animals of Australia,” A. S. LeSouef, C.M.Z.S., R.A.O.U.

October 19th.—“London Commons and Forests,” “Pathfinder.”

November 2nd.—“Butterfly Migration,” C. Mellows, M.A., F.E.S.

December 7th.—Annual General Meeting.

December 21st.—“Evolution of the House,” Edward Yates.

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

HONORARY MEMBERS

1901 Grant, G. F. H., 3, Westbourne Street, Hyde Park, W.2. (Arch.)
1899 Massey, Herbert, M.B.O.U., F.E.S., Ivy Lea, Burnage, Didsbury, Manchester. (Lep., Orn., Ool.)
1894 Burrows, Rev. C. R. N., F.E.S., The Vicarage, Mucking, Stanford-le-Hope, Essex. (Lep.)
1927 LeSouef, A. S., C.M.Z.S., R.A.O.U., Taronga Zoological Park Trust, Sydney, Australia.
1927 Wolstenholme, H., B.A., M.B.O.U., R.A.O.U., Wahroonga, Sydney, Australia.

MEMBERS

1892 Adkin, R., F.E.S., "Hodeslea," Meads, Eastbourne. (Lep.)
1925 Aldred, Miss B. A., 16, Boscastle Road, Dartmouth Park, N.W.5.
1927 Aldred, Miss K. V., 5, Ladbroke Court, Ladbroke Gardens, W.11. (Arch., Orn.)
1922 Aldred, Miss M., Flat 5, 21, Ladbroke Gardens, Notting Hill, W.11. (Orn.)
1925 Archbould, R. S., Forest Way, Loughton. (Orn.)
1924 Aris, A., 1, Ivy Villas, Oldfield Road, Hampton.
1915 Aris, E. A., F.Z.S., 9, Oak Avenue, Priory Road, Hornsey, N.8. (Lep.)
1925 Ash, Edward C., M.R.A.C., F.R.M.S., c/o Midland Bank, Chelmsford, Essex. (Pond Life, Spiders).
1892 Austin, S., 43, Darenth Road, Stamford Hill, N.16. (Orn., Arch.)
1927 Baily, Miss A. R., Cressex Lodge, Binfield, Berks. (Arch., Bot., Orn., Ent., Plant Galls, R.)
1921 *Baker, Edward C. S., J.P., O.B.E., F.Z.S., F.L.S., M.B.O.U., H.F.A.O.U., 6, Harold Road, Upper Norwood, S.E. 19. (Orn.)
1927 Baldock, G. R., 467, Hertford Road, Enfield Highway. (Lep.)
1927 Barclay-Smith, Miss P., Park Lodge, Hervey Road, Blackheath, S.E.3. (Orn.)
1927 Barr, Mrs. Margaret, 16, Roland Gardens, S.W.7. (Orn.)
1903 *Battley, Mrs., 6, Craven Avenue, West Ealing, W.13.
1915 Bayne, Charles S., 56, Prince of Wales Mansions, Battersea Park, S.W.11. (Orn.)
1926 Benn, Miss A., 68, South Esk Road, Forest Gate, E.7. (Orn.)
1927 Best, Miss M. G. L., F.Z.S., M.B.O.U., 123, Cheyne Walk, S.W.10. (Orn.)
1920 Biddiscombe, W., "Whincroft," Ivy Lane, Woking. (Bot.)
1925 Bidwell, Edward, 12, Woodberry Grove, Finsbury Park, N.4. (Orn.)
1896 Bishop, E. B., "Lindfield," Marshall Road, Godalming. (Bot., Arch., Plant Galls., Orn.)
1926 Blackett, Miss F., 196, Cromwell Road, S.W.5.
1926 Blezard, Miss R., F.Z.S., 89, Eaton Square, S.W.1. (Orn., Bot.)
1921 Blount, S., 40, Woodhurst Road, Acton, W.3. (Arch.)
1925 Boardman, Stuart, "Green Rigg," Friary Lane, Woodford Green, Essex. (Orn.)
1902 Braithwaite, J. O., 18, Warren Road, Chingford, E.4. (Micr., Bot., Ent.)
1910 Braithwaite, Miss N. A., 18, Warren Road, Chingford, E.4.

1916 Brown, A., 44, Ravensdale Road, Stamford Hill, N. 16. (Orn., Arch., Geol., R.)
 1926 Browne, Miss Constance H., 219, Harlesden Road, Willesden, N.W.10 (R., Arch.)
 1915 Burkhill, H. J., M.A., F.R.G.S., 3, Newman's Court, Cornhill, E.C.3. (Plant Galls, Lep., Bot., Geol., Orn., R.)
 1926 Burnet, Ian G. W., 80, Blenheim Gardens, N.W.2. (Orn.)
 1912 Capleton, A., Beanfort House, 37, Lansdowne Road, South Woodford. (Mam., Orn., R.)
 1926 Carr, Miss A. N., 7, Cambridge Road, Watford. (Orn. R.)
 1911 Chapman, E., 219, Harlesden Road, N.W.10. (Arch., Geol., R.)
 1927 Child, Miss E., Ridley House, 113, Gower Street, W.C.1. (R.)
 1910 Clark, J. W., "Hazeldene," 10, The Ridgeway, Chingford, E. 4. (Bot.)
 1904 Cockayne, E. A., M.A., M.D., F.R.C.P., F.E.S., 116, Westbourne Terrace, W.2. (Lep., Biol.)
 1925 Cocksedge, W. C., 6, Aldersmead Road, Beckenham, Kent. (Orn., Arch.)
 1907 Collenette, C. L., F.E.S., Gothic Lodge, Woodford Green, Essex. (Ent. Orn.)
 1927 Cook, C. A., Whincroft, Ivy Lane, Woking. (Bot., Orn.)
 1900 Cooper, B., 103, Bethune Road, Stamford Hill, N. 16 (Lep., Bot.)
 1892 Cyriax, R. C., 23, Aberdare Gardens, West Hampstead, N.W. 6. (Arch., Aryan question, Indo-European languages.)
 1920 Dallas, J. E. S., 38, Richmond Road, Islington, N. 1. (Orn., Bot.)
 1925 Dallas, Mrs. Rosa F., 38, Richmond Road, Islington, N.1.
 1922 Davis, E. J., M.I.Mech E., Milestone, Church Hill, Loughton. (Orn.)
 1926 Deane, Miss M.B.H., 1, Cromwell Place, S.W.7. (Orn.)
 1910 Dell, F. G., "The Hut," 55, Russell Road, Buckhurst Hill, Essex. (Pond life, Micr., Orn.)
 1927 Dolman, L. H., Trinity School House, Blackheath Hill, S.E.10. (Arch.)
 1927 Druce, F., M.A., F.L.S., 7, Culford Gardens, S.W.3. (Bot.)
 1927 Dunkerley, Rev. C. L., Haleham Vicarage, Staines, Middlesex. (Arch., Orn.)
 1905 Edelsten, H. McD., F.E.S., "Hillside," Lindfield, Sussex. (Lep.)
 1927 Emery, J. W., Windsor Lodge, 450, Upper Richmond Rd., S.W.15. (Orn.)
 1927 English, Miss F., 8, Dorville Rd., Ravenscourt Park, W.6. (Orn., Bot., Arch., R.)
 1927 Evans, E. B., 86, Emmanuel Road, Streatham Hill, S.W.12. (Orn.)
 1907 Eynon, Lewis, B.Sc., F.I.C., "Fernleigh," Hall Lane, Upminster, Essex. (Chem.)
 1925 Farish, Mrs., "Stapleton," 46, Culverley Road, Catford, S.E. 6.
 1926 Farthing, Miss M., Bedford House, 108, Baker St., W.1. (R., Arch.)
 1922 Forster, W. C., 40, Nevern Square, S.W.5. (Arch., R.)
 1924 Foster, John B., "Aldwick," Holland Road, Sutton. (Orn.)
 1920 Gamble, Rev. H. J., M.A., 14, Frederica Road, Chingford, E.4. (Arch., Conch.)
 1927 Gardiner, Miss L., 14a, St. James Road, S.W.17. (Orn., Arch.)
 1910 Gaze, W. E., 10, The Avenue, Highams Park, Chingford, E. 4. (Lep., Bot., Chem.)
 1909 Gerrard, V., 59, Campden Hill Court, Campden Hill Road, Kensington, W.8. (Lep.)
 1927 Glauert, L., Killuspy, Chesham Bois, Bucks. (Orn.)
 1910 Glegg, W. E., F.Z.S., M.B.O.U., The House, Albion Brewery, Whitechapel Road, E.1. (Orn.)
 1921 Glegg, Mrs., The House, Albion Brewery, Whitechapel Road, E 1. (Orn.)
 1927 Green, Roland, F.Z.S., Ruskin Studio, 7, New Court, Lincolns Inn, W.C. (Orn.)
 1899 Greenwood, M., M.R.C.P., M.R.C.S., "Hillcrest," Church Hill, Loughton, Essex. (Arch., Biol.)
 1920 Grinling, C. H., B.A., 71, Rectory Place, Woolwich, S.E.18. (Bot.)
 1927 Hale, R. W., 27, Abercorn Place, N.W.8. (Orn.)
 1898 Hall, L. B., F.L.S., "Lingdene," King's Avenue, Parkstone, Dorset. (Bot., Galls., Biol., Geol., Micr.)

1927 Halton, K. E., Ezbah, Chesham Bois, Bucks. (Orn.)
 1903 Hanbury, F. Capel, Westfield, Hoddesdon, Herts. (Lep.)
 1906 Hanbury, Frederick J., F.L.S., F.E.S., Brockhurst, East Grinstead. (Bot., Lep.)
 1897 *Hanson, P. J., "Burcroft," Village Road, Bush Hill Park, Enfield. (Orn. Arch.)
 1927 Hardiman, Miss A., 1, Chatsworth Road, N.W.2. (Orn.)
 1921 Hardiman, J. P., C.B.E., B.A., 1, Chatsworth Road, Brondesbury, N.W.2. (Orn., R.)
 1923 Harding, J. Rudge, O.B.E., Star and Garter Home, Richmond, Surrey. (Orn.)
 1925 Hart, C., 73, Windsor Road, Forest Gate, E.7. (Orn., Bot.)
 1910 Heath, G. H., M.A., 7, St. Philip's Road, Surbiton, Surrey. (Lep.)
 1926 Hibbert-Ware, Miss A., F.L.S., The White Cottage, Gillwell Lane, near Chingford. (Orn.)
 1926 Hillier, Mrs. B., Aberlyn, Crescent Rd., Bishop's Stortford, Herts. (Conch., Arch.)
 1921 Hobson, G. D., Christ's College, Cambridge. (Lep.)
 1919 Horn, P. W., 10, Sheringham Gardens, Romford, Essex. (Orn., Aquaria.)
 1905 Hornblower, A. B., 91, Queen's Road, Buckhurst Hill, Essex. (R., Arch., Orn.)
 1910 Howard, D. Lloyd, J.P., F.I.C., F.C.S., Pettits Hall, Chigwell. (Chem.)
 1927 Hussey, H. T., 416, High Road, Leyton, E.10. (Arch., Orn., R.)
 1927 Jago, R. P., F.Z.S., Rookwood, Bridle Road, Eastcote. (Orn.)
 1927 Jeffery, H. J., A.R.C.Sc., F.L.S., 45, Wilton Rd., Muswell Hill, N.10. (Bot.)
 1926 Jehan, Kenneth C., 49, Bruce Grove, Tottenham, N.17. (Bot.)
 1925 Jones, Mrs. D. Llewellyn, 5, Russell Gardens, Golders Green, N.W.11. (R.)
 1926 Jones, Jock Ll., 5, Russell Gardens, Golders Green, N.W.11. (R.)
 *Kaye, W. J., F.E.S., "Caracas," Ditton Hill, Surbiton, Surrey. (Lep.)
 1925 Korner, Miss Theodora, 4, Gunterstone Road, West Kensington, W.14. (R.)
 1927 Lane, J. H., 571/3, Commercial Road, E.1. (Chem.)
 1922 Lemon, F. E., M.A., LL.B. (Cantab.), J.P., C.A., "Hillcrest," Redhill, Surrey. (Orn.)
 1922 Lemon, Mrs. M. L., M.B.E., J.P., M.B.O.U., F.Z.S., "Hillerest," Redhill, Surrey. (Orn.)
 1919 Leyton Public Libraries, per the Librarian (Z. Moon, F.R.Hist.S.), Central Library, Leyton, E.10.
 1927 Lister, Miss G., 871, High Road, Leytonstone, E.11. (Orn.)
 1926 Littlejohn, H.A., 27, Ethelbert Gardens, Cranbrook Park, Essex. (Orn.)
 1915 Loney, Herbert, 354, Goswell Road, E.C.1. (Lep., Bot., Geol., Orn., Plant Galls, Arch.)
 1926 Longfield, Miss C.E., F.R.G.S., F.E.S., F.Z.S., 20, Pont Street, S.W.1. (Orn., Ent.)
 1919 Lowne, B. T., "Ravenscroft," 129, Bromley Road, Catford, S.E. 6. (Bot.)
 1911 MacIntosh, Miss I. S., 69, Windmill Hill, Enfield. (Bot.)
 1911 MacIntosh, Miss J. D., 69, Windmill Hill, Enfield.
 1923 *Macpherson, A. Holte, F.Z.S., 21, Campden Hill Square, Kensington, W.8. (Orn.)
 1927 Main, Miss M., 55, Buckingham Rd., E.18. (Ent., Orn.)
 1923 Mann, Edward, 10, Frankland Road, South Chingford, E.4. (Pond Life).
 1916 Mann, F. G., Ph.D., B.Sc., A.I.C., The University Chemical Laboratory, Pembroke Street, Cambridge. (Lep. Orn.)
 1922 Martin, Alan R., 18, Kidbrooke Park Road, Blackheath, S.E.3. (Arch.)
 1926 Martin, Miss L., 21, Station Grove, Wembley, Middlesex. (Arch., Lep.)
 1927 McCullen, Miss A., 15, Cressex Lodge, Binfield, Berks. (Arch.)
 1887 Mera, A. W., 5, Park Villas, High Road, Longton, Essex. (Lep.)
 1926 Mitchell, Miss E., 29, Aberdeen Road, Wealdstone, Middlesex. (Bot.)
 1924 Moore, Miss A. E., 44, Carlton Avenue, Kenton, Middlesex. (Orn.)
 1905 Moore, J. E., 6, Alwyne Villas, Canonbury, N. 1.
 1927 Mounsey, D. J., 5, Harewood Road, South Croydon. (Orn., Ent.)

1926 Niblett, Montague, 10, Greenway, Wallington, Surrey. (Plant Galls.)
 1893 *Nicholson, Miss B., "Rothbury," Langdon Road, Upper Parkstone, Dorset. (Bot.)
 1925 Norman, Cecil, F.L.S., 55, Eccleston Square, S.W.1. (Bot. Orn.)
 1926 *Oldham, Charles, F.L.S., F.Z.S., M.B.O.U., The Bollin, Shrublands Road, Berkhamsted. (Bot., Orn., Conch.)
 1924 Palmer, Miss Fauny, 8, Ulundi Road, Blackheath, S.E.3. (Arch.)
 1925 *Parnell, L., 8, Titchborne Street, W.2. (Orn.)
 1921 Parsons, S. T. T., 129, Gloucester Terrace, W.2. (Orn.)
 1922 Payne, C. H., 13, Kidderpore Gardens, Hampstead, N.W.3. (Orn. Arch.)
 1923 Payne, E. M., 23, St. George's Avenue, Southall, Middlesex. (Bot.)
 1901 Payne, H. T., 70, Castlewood Road, Stamford Hill, N. 16. (Lep.)
 1923 Payne, L. G., "Rosebay," The Tilt, Cobham, Surrey. (Bot.)
 1922 Pethen, R. W., 108, Northwold Road, Upper Clapton, E.5. (Orn. Ent.)
 1925 Pike, L. Elgar, 19, Caversham Avenue, Palmers Green, N. 13. (Rep. Ichth.)
 1927 Piper, Miss G. E. M., 12, Elms Road, Clapham, S.W.4. (Orn.)
 1925 Pooch, Sydney G., 10, Fairfield Road, Crouch End, N.8. (Orn.)
 1910 Pratt, W. B., 10, Lion Gate Gardens, Richmond, Surrey. (Lep.)
 1892 Prout, L. B., F.E.S., 84, Albert Road, Dalston, E.8. (Lep., Biol.)
 1926 Rankin, The Hon. Lady, 48, Eaton Terrace, S.W.1. (Orn.)
 1925 Richardson, Arthur, Barrowell Green, Winchmore Hill, N. 21.
 1891 Riches, J., 52, Calverley Grove, Hornsey Rise, N. 19. (Lep., Bot.)
 1922 Robbins, J. C., F.E.S., "The Rosery," Limpsfield, Surrey. (Bot., Arch., Ent.)
 1892 Robbins, R. W., "The Rosery," Limpsfield, Surrey. (Bot., Lep., Orn., Arch.)
 1893 Robbins, Mrs., "The Rosery," Limpsfield, Surrey. (Bot., Arch., Orn.)
 1925 Roberts, H. V. Molesworth, 7, Mallows Road, Wallington. (Arch.)
 1924 Robertson, Lady Dorothy, 66, Park Street, W. (Orn.)
 1910 *Ross, J., 18, Queens Grove Road, Chingford, E.4. (Bot., Plant Galls, Orn.)
 1890 Routledge, G. B., F.E.S., Tarn Lodge, Headsnook, Carlisle. (Lep. Col. Hem.)
 1923 Sagar, H., Holly Hill Farm, Botany Bay, Enfield. (Orn., R.)
 1910 Samuelson, Edward, 2, Crown Buildings, The Green, Chingford, E.4. (Mam., Rep., R.)
 1901 Shaw, V. Eric, "Betula," Park View Road, New Eltham. (Hym. Lep. Micr., Api.)
 1927 Shoosmith, F. H., B.Sc., Ph.D., "Whitgift," Grange Road, Sutton, Surrey.
 1927 Simes, J. A., O.B.E., F.E.S., Kingsley Cottage, Queen's Road, Loughton. (Ent.)
 1911 Simpson, W., M.B., B.S., D.P.H., "The Ivies," 3, Adelaide Road, Andover, Hants. (Arch., Bot., Lep., Plant Galls.)
 1892 Smith, C. B., 61, Onslow Gardens, Muswell Hill, N. 10. (Lep.)
 1927 Smith, Miss G. L., 35, Maidenstone Hill, Greenwich, S.E.10. (Arch.)
 1926 Smith, Miss M. H., 23a, Glenfield Rd., Balham, S.W.12. (Orn., Bot.)
 1922 Spooner, Herman, 21, Musgrave Crescent, Walham Green, S.W.6. (Orn., Bot., Arch., R.)
 1927 Stanley, S. F., Eversley, The Crossways, Gidea Park, Essex. (Arch., Orn.)
 1927 Steinmann, E., 152, Lordship Road, Stoke Newington, N.16. (R., Orn., Bot.)
 1920 *Stowell, H. S., L.R.I.B.A., 26, Queen's Gardens, Ealing, W.5. (Arch.)
 1927 Tarver, A., 7, Stuart Rd., Thornton Heath, Surrey. (Arch. Conch.)
 1926 Taylor, Mrs. K., 169, High Street, Homerton, E.9. (Orn.)
 1920 Thomas, Mrs. G. E., 9, Talbot Road, Isleworth, Middlesex. (Orn., R.)
 1927 Thresher, Miss G. A., 34, Henrietta Street, W.C.2. (Arch.)
 1892 Tremayne, L. J., Avenue House, Northumberland Avenue, W.C.2. (Bot., Lep., Arch., Plant Galls, Orn., R.)
 1908 Tremayne, Mrs., Avenue House, Northumberland Avenue, W.C.2. Orn., Arch., Bot. R.)
 1923 Trench, R. H., Hall Barn Cottage, Beaconsfield, Bucks. (Orn., R.)
 1925 Tucker, Leslie, F., "Danebury," The Chine, Grange Park, N. 21. (Lep.)
 1911 Van Lessen, R., B.Sc., 78, Wellington Road, Bush Hill Park, Middlesex. (Chem.)

1927 Veitch, Miss A., 3, Sherrard Road, Forest Gate, E.7. (Arch.)
 1927 Waller, G., 88, Beckenham Road, Beckenham, Kent. (Orn.)
 1925 Ward, Bernard T., 24, Long Deacon Road, Chingford, E.4. (Bot., R.)
 1911 Warren, S. Hazzledine, F.G.S., F.Z.S., "Sherwood," Loughton. (Prehistoric Anthropology, Geol.)
 1920 Watkins, Miss H., 12, Connaught Avenue, East Sheen, Mortlake, S.W. 14. (Orn., R.)
 1927 Watkins, Miss M. A., 12, Connaught Avenue, East Sheen, S.W. 14. (Arch.)
 1926 Watt, Hugh Boyd, 90, Parliament Hill Mansions, N.W. 5. (Orn. Ecology, Zoo., Bot.)
 1925 *Watt, Mrs. Winifred Boyd, 90, Parliament Hill Mansions, Lissenden Gardens, N.W. 5. (Orn.)
 1911 Wattson, R. Marshman, 32, St. Andrew's Road, Stoke Newington, N. 16. (Arch. Ent.)
 1927 Wharton, Miss D. C., xxth Century Club, 29, Stanley Gardens, W.11. (Bot. Ent. R.)
 1913 Wilde, Mrs. C. L., "Lindfield," Marshall Road, Godalming. (Arch., Bot., Galls)
 1922 Wilkinson, E. B., F.L.S., 7, Colville Square, W.11.
 1925 Wilks, M., 46, The Mall, Southgate, N. 14. (Bot.)
 1880 Williams, C. H., 5, Lower Belgrave Street, Eaton Square, S.W. 1. (Lep.)
 1902 Willsdon, A. J., 46, Dover Road, South Wanstead, Essex. (Lep.)
 1927 Wooltortou, F.L.D., B.Sc., 9, Southbury Road, Enfield, Middlesex. (Arch.)
 1926 Wright, Max A., The Press Club, St. Brides House, Salisbury Square, E.C.4. (Orn., Bot.)

BRANCH ASSOCIATES

1927 Blake, Trevor, J. S., 91, Station Road, Chingford, E.4. (Arch. Mier.)
 1927 Boothroyd, J. W., 27, Buxton Road, Chingford, E.4.
 1920 Chandler, J. H., J.P., 22, Scholars Road, Chingford, E.4.
 1923 Clark, Harold, "Hazeldene," The Ridgeway, Chingford, E.4.
 1921 Collard, Miss Alice M., 19, Mount View Road, Chingford, E.4.
 1925 Connoll, A., "Windyridge," Connaught Avenue, Chingford, E.4.
 1914 Connoll, Miss E., 47, Buxton Road, Chingford, E.4.
 1910 Cox, Oswald F., "Croftdown," Shepherd's Hill, Highgate, N.6. (Bot.)
 1921 Davis, Mrs. F. H., 41, Mornington Road, Chingford, E.4.
 1923 Dunn, Mrs. Edith M., 10, The Drive, Chingford, E.4.
 1922 Dupère, Miss Frances, 87, Station Road, Chingford, E.4.
 1920 Gain, Mrs. E. R., 49, Buxton Road, Chingford, E.4.
 1926 Gamble, Mrs. H.M.A., 9, Park Hill Road, Chingford, E.4.
 1926 Gamble, Miss Winifred, 9, Park Hill Road, Chingford, E.4.
 1910 Greengrass, Miss Madeleine, The Croft, Chingford Green, E.4. (Lep.)
 1920 Hart, Miss H., The Green Farm, Chingford, E.4.
 1923 Harvey, Cecil O., B.Sc., 1, Park Hill Road, Chingford, E.4. (Geol.)
 1922 Harvey, T. F., F.I.C., 4, Park Hill Road, Chingford, E.4.
 1920 Huck, H., M.P.S., 35, Warren Road, Chingford, E.4.
 1922 Hunt, S. L., 153, Romford Road, Stratford, E. 15. (Bot., Ent.)
 1926 Kay, Mrs. Beatrice, M.Sc., 7, Victoria Road, Chingford, E.4. (Bot.)
 1924 Lambert, G., 37, The Ridgeway, Chingford, E.4.
 1921 Lloyd, Miss F. M., 41, Mornington Road, Chingford, E.4.
 1925 Mancell, W. A., 4, Connaught Avenue, Chingford, E.4. (Orn.)
 1911 Mathieson, Miss M. L., 7, Crescent Road, Chingford, E. 4. (Meteorology.)
 1924 Nix, Miss, Mornington School, Chingford, E.4.
 1922 Patterson, Dr. R., F.L.S., M.R.I.A., 16, Philbeach Gardens, Earl's Court, S.W.5.
 1927 Pettit, Mrs. S., "Colham," 2, Victoria Road, Chingford, E.4.

1927 Pettit, S., "Colham," 2, Victoria Road, Chingford, E.4.
 1920 Proctor, Mrs. E. M., 2, Woodland Road, Chingford, E. 4.
 1919 Puck, Alec, 12, The Ridgeway, Chingford, E. 4.
 1925 Radmall, Leslie, 48, Douglas Road, Chingford, E. 4.
 1923 Restall, W. L., J.P., "Chingwood," Woodland Road, Chingford, E.4.
 1925 Saul, H., Barclay's Bank, Chingford, E. 4.
 1903 Stevenson, H. E., F.C.S., 22, Wilton Grove, Wimbledon, S.W. 19. (Chem.)
 1927 Stopps, W. E., 6, Gordon Road, Chingford, E.1.
 1923 Trounce, J. P., J.P., "Woodside," Sewardstone Bury, Chingford, E.4.
 1923 Trounce, Mrs., "Woodside," Sewardstone Bury, Chingford, E.4.
 1922 Ward, Arthur H., "Mayfield," Kimberley Road, Chingford, E.4.
 1927 Wilkes, Miss L., 24, Woodland Road, Chingford, E.4.
 1922 Wright, W. A., "Ringstead," Old Church Road, Chingford, E.4. (Orn.)
 1920 Young, J., 87, Station Road, Chingford, E. 4.

COUNTRY AND SCHOOL ASSOCIATES

1921 Bailey, Mrs. Stephen, 45, Bridge Street, Godalming.
 1907 Bickham, Spencer H., Underdown, Ledbnry. (Bot.)
 1908 Blake, W., Acacia Villa, Ross, Herefordshire. (Orn., Conch.)
 1908 Bostock, E. D., Oulton Cross, Stone, Staffordshire. (Lep.)
 1901 Cassall, Dr. R. T., F.E.S., Colwill House, Abertillery, Mon. (Lep.)
 1924 Collins, Miss Florence, School of Gardening, Clapham, near Worthing, Sussex. (Orn.)
 1904 Cooke, Rev. P. H., M.A., Ickleton Vicarage, Great Chesterford, Essex. (Bot.)
 1892 Culpin, Millais, M.D., F.R.C.S., "Meads," Loughton, Essex. (Biol.)
 1926 Farthing, Miss E., Jesmond House, Bradford Road, Batley, Yorks. (Arch.)
 1901 Grubb, W. C., Belgravia, Barberton, Transvaal. (Geol.)
 1923 Hardiman-Nash, K. O., Nightsgift, Highwood, Ringwood, Hants. (Orn.)
 1923 Hardiman-Nash, Mrs. E. G., Nightsgift, Highwood, Ringwood, Hants. (Orn.)
 1915 Hopkins, Prof. F. G., M.A., M.D., F.R.C.P., F.R.S., 71, Grange Road, Cambridge. (Biochemistry.)
 1902 Miller, Miss E., "The Croft," Rainsford Lane, Chelmsford. (Lep.)
 1905 Moore, J. W., Middleton Dene, Middleton Hall Road, King's Norton, Birmingham. (Lep.)
 1918 Pike, Oliver G., F.Z.S., M.B.O.U., The Bungalow, Leighton Buzzard.
 1914 Studd, E. F., M.A., B.C.L., F.E.S., Exeleigh, Starcross, Devon. (Lep.)
 1904 Ward, J. Davis, "Linchurst," Grange-over-Sands, Lancs. (Lep.)

NOTE.—The following abbreviations are used in the above lists:—Api., Apiculture; Arch., Archaeology; Ast., Astronomy; Biol., Biology; Bot., Botany; Chem., Chemistry; Col., Coleoptera; Conch., Conchology; Dipt., Diptera; Ent., Entomology; Ethn., Ethnology; Geol., Geology; Hem., Hemiptera; Hym., Hymenoptera; Icht., Ichthyology; Lep., Lepidoptera; Mam., Mammalogy; Micro., Microscopy; Neur., Neuroptera; Orn., Ornithology; Orth., Orthoptera; Ool., Oology; R. Ramblers Section; Rep., Reptilia; Zoo., Zoology. * Signifies a Life Member.

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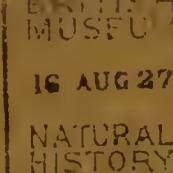
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THE SOCIETY is an amalgamation of the City of London Entomological and Natural History Society, founded in 1858, and the North London Natural History Society, founded in 1892.

Meetings are held on the First and Third Tuesdays in each month, in Hall 40, Winchester House, Old Broad St., E.C. The meeting room is open from 6 p.m. to 9 p.m., and meetings commence at 6.30 p.m. punctually, unless other arrangements are announced.

The Chingford Local Branch meets at the Avenue Café, opposite Chingford Station, at 8 p.m., on the First Monday in each month.

At these meetings specimens in various branches of Natural History are exhibited, and papers on various subjects are read and discussed. Visitors are cordially welcomed on the introduction of a member of the Society.

The Minimum Annual Subscription for Members is 7s. 6d., and for Associates 2s. 6d. Each Member will be entitled to one copy of "The London Naturalist" free; extra copies can be purchased by Members at two-thirds of the published price. All Subscriptions become due on January 1st. Members elected after June 30th pay 5s. for the year of their election.

New Members and Associates pay an entrance fee of 2s. 6d.

The Subscription is fixed at as moderate a sum as is possible, consistent with the proper maintenance of the Society and its work, in order that all may avail themselves of the benefits offered. The Society therefore looks with confidence for the support of all who are interested in the study of Natural History.

Further information may be obtained from the Secretary.

